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VETERINARY MEDICINE

SEPTEMBER CONTENTS 1948

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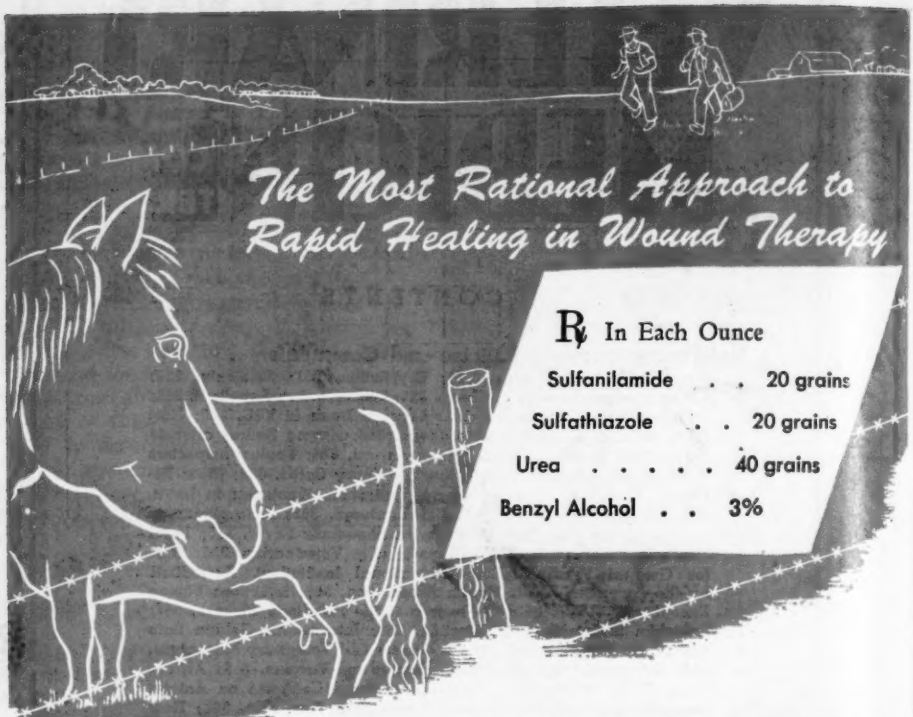
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The internal use of remedies owes its origin neither to empiricism nor to magic but to animal instinct.

—♦—

Decapryn is the latest addition to the list of antihistamine drugs. Ethan Allen Brown reports (*Annals of Allergy*) that in his use of the drug 80% of allergic symptoms were relieved. In bronchial asthma, as with other antihistaminic drugs, the results in a given case were unpredictable. In 54 cases 30% were much relieved, 40% were benefited and in 30% there was no noticeable benefit.

—♦—

"Crysticillin" is the trade name of a crystalline powder of penicillin G combined with a procaine base. The special merit claimed for this new preparation is the maintenance of a prolonged therapeutic blood level of penicillin when suspended in distilled water and injected. In man a single dose of 300,000 units of penicillin G is said to maintain a therapeutic blood level for 24 to 36 hours.

—♦—

A chemical twice as powerful as adrenalin has been isolated in crystal form from blood by scientists of the Cleveland Clinic Foundation. The drug is called serotonin—blood serum tonic—and will likely be helpful in coronary heart disease and shock.

Since a large amount of blood is needed to produce a small portion of serotonin, the chemical structure of the drug is being investigated with the hope that it may be produced synthetically.

Diseases of sheep caused by parasites outstrip all others in importance. Stomach worms are the No. 1 enemy of sheep. Liver flukes produce a high morbidity and mortality wherever they gain a foothold. Nodular worms are a difficulty in finishing late lambs for market. Lungworms, tapeworms and other parasites are other causes of aggregate losses, which have caused sheepmen to go out of the sheep business.—USDA.

—♦—

Tests were made of various tick-repellent substances on soldiers' uniforms in sections of Texas where nymphs and adults of the lone star tick (*Amblyomma americanum*) were plentiful. Of the agents experimented with butylacetanilide was most efficacious; affording excellent protection up to 10 days when the uniform was treated with one ounce of the drug. It also afforded complete protection against chiggers.

—♦—

Experts in the U. S. Bureau of Entomology and Plant Quarantine have repeatedly conducted experiments in the United States, Panama and Mexico which indicate that the mosquito population of an area can be reduced an average of 98% by a single application of 5% DDT spray. Considering the success of a single application it is suggested that repeated treatments might eradicate the pests and thus free large areas of the most disabling disease of the human inhabitants of those areas.

VETERINARIANS IN THE NEWS

Iowa newspapers recently featured the award of a Community Service Medal to Dr. R. M. Young of Parkersburg for heading a successful community rat extermniation campaign.

—♦—

Operation Hardware

Rumenotomy in the dairy cow for removal of foreign bodies from the reticulum is the subject of a story in the July issue of the *Country Gentleman,* entitled "Operation Hardware".

Arthur B. Christian, V.S. and Edward L. Shuford, D.V.M., Asheville, N. C., feature in the role of principals in this account of a veterinary operation. Post-mortem examinations revealed that of approximately 100 cows that died in the Biltmore Dairy Herd in a 10-year period, almost exactly one-halt died from ingested foreign bodies. This percentage, they believe, holds for the loss in other well-cared-for dairy herds, as a result of traumatic perieardiitis.

The most important part of the treatment is early diagnosis. In 20 rumenotomies performed recently 18 recovered promptly, two died. Both of the latter, the surgeons believe, would have recovered if they had been operated upon earlier. Herdsmen in the b ter dairies are counseled to be on the alert for cows that walk gingerly, particularly with the front feet, are especially reluctant to move down hill, feed poorly or not at all, and show a drop in milk production. When he observes these symptoms of foreign body penetration of the walls of the reticulum, the herdsman is instructed to call a veterinarian without delay. If, when the doctor arrives, he finds, in addition to the foregoing symptoms, an elevated temperature, a rapid and perhaps irregular pulse, and quickened respiration, the diagnosis is reticulitis, and only requires confirmation with the stethoscope to start the operation. This final test is made by holding the stethoscope against the trachea near the thoracic entrance while an assistant percusses beneath the reticulum. If a faint grunt is heard when the tapping approaches the wire, nail or other object that is injuring the wall of the second stomach, the animal is operated upon immediately.

The *Country Gentleman* story is attractively illustrated.

No Accounting for Calf's Appetite

An illustrated feature story in Sunday Pioneer Press (St. Paul, Minn. June 20, 1948) described a rumenotomy on a yearling Holstein-Friesian heifer by Dr. J. R. Berggren, Baldwin, Minn. Interest centered chiefly in the repossession of a wallet containing $245 which the calf had eaten along with its owner's overalls.

The currency was usable and the calf lived.

—♦—

Sterility—Due to Undeveloped Pituitary Gland

T. Royal Rupert 99th, a Hereford bull, the property (by reason of the transfer of $38,000) of Roy Turner, governor of Oklahoma, received an intimate write up in an Associated Press story July 3rd. The Governor is understandably anxious for a "T. Royal Rupert 100th", but so far the big bull has sired nothing but disappointment, in fact shows no interest in royal progeny.

Because of the disparity between the cost of Rupert and his value as bologna, he has been sent to the Iowa State College at Ames for an operation. Dr. M. A. Emmerson, after a guarded prognosis, frankly on the discouraging side, will equip Rupert with a normal pituitary gland to take over the functions which his own infantile pituitary is unable to perform. The normal hypophysis, on the fate of which so many dollars hang, will be obtained from an animal slaughtered in a local abattoir, and will be grafted into Rupert's burly neck.

—♦—

Cesarean Section Prevents Loss of Many Fine Dairy Cows

The Fennimore Times (Fennimore, Wisconsin May 26, 1948), home town newspaper of Dr. R. B. Hipenbecker ran a well written, illustrated article recently pointing the advantages of cesarean in cases of difficult parturition. Incidental reference was made to the fact that Doctor Hipenbecker performs the operation frequently with "surprisingly small loss of calves and almost no mortality of the dams".

Doctor Hipenbecker is president of the Southwestern Wisconsin Veterinary Medical Association.

Leasure New Dean of Veterinary School at Kansas State College

E. E. Leasure, D.V.M., M.S., was elected dean of the School of Veterinary Medicine, Kansas State College, effective July 1, 1948. Doctor Leasure received his degree in vet-

E. E. Leasure

erinary medicine in 1923 and in science in 1930, both from K. S. C. He has been on the college faculty since 1926 when he joined the staff as instructor in pathology, advancing to professor in 1935 and to head of the Physiology department in 1944.

Hart Appointed Dean of California Veterinary College

Dr. George H. Hart, UP '03, is the new dean of the School of Veterinary Medicine, University of California, succeeding Dr. C. M. Haring, who retired July 1st.

Doctor Hart entered the B.A.I. service immediately upon graduation. In 1910 he resigned to accept the position of city veterinarian of Los Angeles and served the second seven years of his professional career in that capacity. In 1917 he accepted an appointment as assistant professor of Veterinary Science in the University of California and served his third septenate in that position. In 1924 he was promoted to the grade of professor and in 1926 he was made head of the Animal Husbandry Department in the College of Agriculture from which he was transferred to the School of Veterinary Medicine July 1.

Although Doctor Hart's official work has lain outside the field of veterinary medicine for 20 years, his interest in the profession and its activities has not slackened. He has been a regular attendant at A.V.M.A. and U. S. Livestock Sanitary Association meetings and a frequent contributor to the programs of both associations. He has also attended recent international veterinary congresses and is chairman of the A.V.M.A. committee on the 14th International Veterinary Congress, which will be held in London in August, 1949. The research in which Doctor Hart has engaged in recent years had dealt chiefly with animal nutrition and has been extensively reported in veterinary publications. During the International Livestock Show in Chicago last December his portrait was hung in the Saddle and Sirloin Club's gallery of heroes* of animal husbandry.

The new School of Veterinary Medicine, buildings for which are under construction at a cost of six million dollars, will be opened for students this fall, when a class of 40 will be admitted. With the completion of the building program, the classes will be enlarged.

Haring Retires After 44 Years with University of Calif.

Dr. Clarence Melvin Haring, CORN '04, retired July 1st after more than 44 years with the University of California; 35 years as head

C. M. Haring

of the Department of Veterinary Science. From 1920 to 1924 he was also director of the California Agricultural Experiment Station. In 1924 he spent a year in graduate study in Switzerland while on sabbatical leave. Since April, 1947, he had been dean of the new School of Veterinary Medicine at the University. Doctor Haring served in World War I as a Captain in the Veterinary

*Vet. Med. 43:1, p. 8. 1948

Corps and in World War II as veterinary consultant to the War Manpower Commission. He was secretary of the A.V.M.A. in 1915-16. He has engaged extensively and productively in veterinary research and has contributed largely to veterinary literature.

Hinshaw Wins Borden Award

W. R. Hinshaw

Dr. W. R. Hinshaw, College of Veterinary Medicine, University of California, was the recipient of the Borden Foundation cash award of $1,000 for outstanding work in poultry pathology.

The presentation was made at the recent meeting of the Poultry Science Association at Fort Collins, Colorado.

Poultry Inspectors Wanted

Many positions are available to veterinarians as poultry inspectors in the U. S. Department of Agriculture. The entrance salary for this position is $3,727.20 a year, with the prospects of an increase in a few months to $4500. This work affords an attractive career for veterinarians under 40 years of age.

Interested veterinarians should contact by mail or otherwise one of the following:

Dr. J. R. Harney, Regional Supervisor,
Poultry Inspection Section, P & MA,
U. S. Dept. of Agriculture,
Room 604-C U. S. Custom House,
Philadelphia, Pennsylvania.

Dr. W. S. Buchanan, Regional Supervisor,
Poultry Inspection Section, P & MA,
U. S. Dept. of Agriculture,
Room 910 U. S. Custom House, 910 S. Canal St.,
Chicago 7, Illinois.

Dr. R. E. Willie, Regional Supervisor,
Poultry Inspection Section, P & MA,
U. S. Dept. of Agriculture,
Room 406 Post Office Bldg.,
Omaha, Nebraska.

Any interested in positions in the Chicago area are asked to wire the Chicago office collect.

Appointment in the Veterinary Corps

Appointment in the Veterinary Corps Reserve and the Veterinary Corps Regular Army is limited to graduates of schools of veterinary medicine approved by the Surgeon General of the Army. Veterinary schools in the following institutions in North America have been approved:

Alabama Polytechnic Institute, Auburn, Alabama;

Colorado A & M College, Fort Collins, Colo.;

Iowa State College, Ames, Iowa;

Kansas State College, Manhattan, Kansas;

Michigan State College, East Lansing, Mich.;

New York State Veterinary College at Cornell University, Ithaca, New York;

Ohio State University, Columbus, Ohio;

Ontario Veterinary College, University of Toronto, Ontario, Canada;

University of Pennsylvania, Philadelphia, Penna.;

Texas A & M College, College Station, Tex.;

State College of Washington, Pullman, Washington.

Physiologia Comparata et Oecologia

A new quarterly embodying original research in the field of comparative physiology and ecology is presented (April, 1948). It appears designed to meet the need of general physiologists and zoologists interested in such subjects as nutrition, feeding mechanisms, locomotion, reproduction, or marine biology. Fundamental work only is acceptable to its editors, and those articles dealing exclusively with applied biology are to be rejected. Articles are published in English, French, or German, with summaries in two languages.

Articles in the first issue include: Physiological Mapping of Giant Nerve Fibre Systems in Polychaete Annelids; X-ray Studies on the Movements of the Hen's Intestine; Respiratory Movements of the Chicken During the Parafoetal Period; Sur L'Osmoregulation De Anodonte, and Die Zucht Das Feldhasen in Gefangenschaft. Obviously the first three are written in English, the fourth in French and the fifth in German.

The new magazine has a corps of 16 distinguished editors from 10 countries. The publisher is Dr. W. Junk, Den Haag, Netherlands.

The Pasteur Institute of Southern India at Conoor, gave antirabies treatment to 40221 persons from 1907 to 1946 inclusive. Of these patients 402 (0.99%) died of rabies. Since 1922 subsidiary centers have been established in which 208,481 persons have received antirabic treatment, of whom 716 (0.34%) died of rabies. Of the animals involved in rabies fatalaties since 1908, 95.6% were dogs.—*J. Am. Med. Assn.* 7-17-48.

Jenkins reports (*J. of International Col. of Surg.*) success in the use of the gelatin sponge (gelfoam) to control hemorrhage from experimental wounds in dogs, including multiple wounds of the surface of the liver, a through and through scalpel wound of the aorta, a wound of the vena cava from which hemorrhage was profuse and a wound of the heart. He believes this hemostatic agent possesses great potential value in clinical surgery.

Transplantation of Ova in the Hen

At the recent meeting of the Poultry Science Association at Fort Collins, Colo., M. W. Olsen, USDA, exhibited a color motion picture showing an operation by which he successfully removed ripe but unfertilized ova from the ovary of one hen and introduced them in the fallopian tube of another. The transplanted ova were then fertilized by artificial insemination and hatchable eggs produced, thus proving that fertilization takes place in the oviduct, not on the ovary as some have contended..

Penicillin in Rheumatic Fever

At the June meeting of The American Medical Association in Chicago, scientists of The House of the Good Samaritan in Boston reported the use of penicillin pills three times daily for 10 days in young children affected with rheumatic fever and accompanying streptococcus infection in their throats. This treatment suppressed, if not banished, the infection in almost all the cases.

An outbreak of the disease was checked abruptly at the House upon the administration of penicillin. It is suggested by the scientists making the report that penicillin be given when there is an outbreak of streptococcic sore throat in schools or in the community and thus ward off rheumatic fever.

That anorexia following the use of a sulfonamide can be prevented by the addition of niacinamide to the sulfa drug, is stated by L. S. Goldstein in the *New York State Journal of Medicine.*

Verge reports that in France, where tuberculosis is common in dogs, that 65.7% of the cases are due to the human type of *Mycobacterium tuberculosis* and 34.3% to the bovine type of the bacillus. The human type of the infection is commonest in dogs that live near coffee stalls, wine shops and restaurants and other places where the pavements are polluted with human sputum.—*Vet. Bul.*

Fatal Hemorrhages Prevented

A dog which had stopped breathing for eight minutes and other dogs apparently dead for lesser periods were restored to life by transfusion of blood under pressure into an artery. Such transfusions saved many human patients who otherwise would have succumbed to fatal hemorrhages upon operation or from injuries, reports I. H. Page of the Cleveland Clinic Foundation.

Veterinarian Contracts Brucellosis

The *Virginia Medical Monthly* (February 1948) reports a grave case of acute brucelloses in a young veterinarian, who recovered under streptomycin therapy after various other treatments had failed to improve his condition. He had removed placentas from cows with *Brucella abortus* infection.

In an abstract in the *J. Am. Med. Assn.* (June 19, 1948) the case is described as follows:

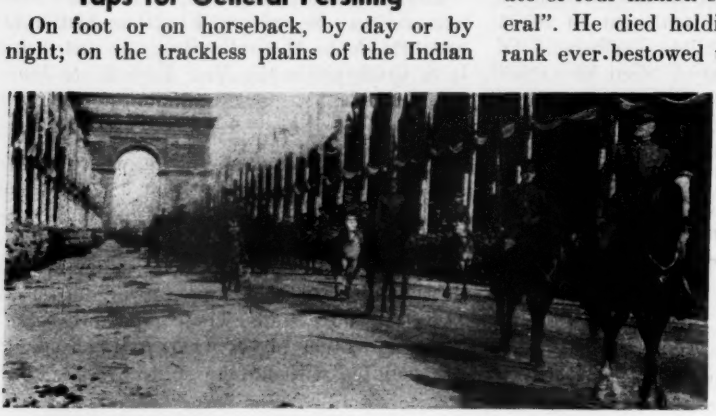
Headaches, moderate fever and malaise had persisted five to six weeks and for three weeks he had had daily shaking chills and generalized aching late in the afternoon with elevations of temperature to 103°F. An agglutination test was reported positive for brucellosis in a dilution of 1:6,400. About six days prior to admission the patient received an injection of Brucella antiserum intramuscularly without effect on his clinical condition. The patient lost an additional 15 pounds during his first 20 days in the hospital. From the 21st to the 27th. day, there was a slow downward curve in the temperature peak, chills disappeared and the patient began to improve subjectively. Intramuscular streptomycin therapy was begun on the 29th hospital day and after *Brucella abortus* had been isolated from blood culture. Four days after the initiation of streptomycin therapy the temperature began to subside, reaching normal on the 11th day of therapy. Five months later the patient had returned to work and had regained his normal weight without return of signs or symptoms of the disease.

Taps for General Pershing

On foot or on horseback, by day or by night; on the trackless plains of the Indian Wars, in the steaming jungles of Mindanao; leading the 10th Cavalry up San Juan Hill; on the burning sands of Mexico; in the sticky mud of France, and in the monotony of frontier posts, he was every inch a soldier, and a diplomat and statesman, too.

In peacetime "Black Jack's" 10th Cavalry was the show organization of the Army.

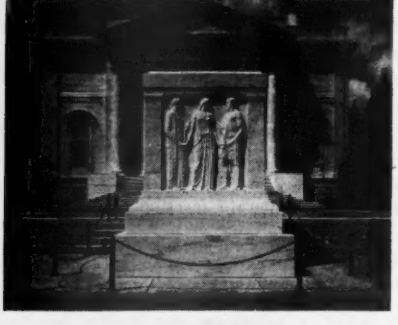
Thirty years ago 2,240 veterinarians were in his command. Three presidents, Theodore Roosevelt, Woodrow Wilson and Franklin Delano Roosevelt honored him above every other soldier in the nation, but that was commonplace compared to the prideful tribute of four million soldiers—"that's our general". He died holding the highest military rank ever bestowed upon an American.*



GENERAL PERSHING AND U.S. ARMY OFFICERS AT THE FETE'S DE LA VICTOIRE ON THE CHAMPS ELYSEE, PARIS, BASTILE DAY, 1919. APPROPRIATELY THE ARC DE TRIOMPHE DE L'ELOILE MAY BE SEEN IN THE BACKGROUND

Five hundred thousand persons lined the course of the funeral cortege from the Capitol to Arlington. Internment was near the tomb of the Unknown Soldier.

We shall not see his equal soon again—if ever.



THE TOMB OF THE UNKNOWN SOLDIER
ARLINGTON NATIONAL CEMETERY

An impressive ceremony was held at 11 a.m. Monday, August 26th, 1940, when members of the A. V. M. A. met in Arlington, across the Potomac from Washington, and placed a wreath on the tomb of the Unknown Soldier.

Institutions Accredited by the American Public Health Association

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North Carolina, University of School of Public Health Chapel Hill, N. C.	M.P.H., Dr.P.H.
Toronto, University of School of Hygiene Toronto 5, Ontario, Canada	D.P.H.
Tulane University School of Medicine Department of Public Health New Orleans 13, La.	M.P.H.
Yale University School of Medicine Department of Public Health New Haven, Conn.	M.P.H., Dr.P.H.

*—General of the Army, Douglas McArthur was a Marshall in the Philippine Army, but the War Department calls him "General."

Infectious Equine Encephalitis 1948

The first B.A.I. report of the season on the occurrence of equine encephalomyelitis in 1948 was issued July 20th. It recorded a total of 130 cases, 65 of them fatal in 14 states. Of this number 80 cases occurred in four states; Oklahoma 26, Florida 23, Kansas 17 and California 14.

Poor appreciation of the importance of collecting statistics of animal disease prevalence is indicated in 17 states by the absence of any report from them. If reports are to be received from the livestock sanitary authorities from only two-thirds of the states, their value will be much impaired. Last year more than a third of all the cases occurred in a single state (Louisiana). If that loss had been in a state where the livestock sanitary officials were non-cooperative, the report for the whole country would have given a far from accurate picture of the situation. If future performance in this respect is not materially improved, the names of neglectful officials will be published.

—♦—

Q Fever a Cattle Handler's Disease

Queenland (Q) fever was first recognized in Australia 11 years ago, and soon afterward in Montana. Spontaneous infections are chiefly among those who are associated with cattle—stockmen, employees in abattoirs and veterinarians. The causal organism, *Rickettsia burneti,* is carried by various cattle ticks. However, infection is not dependent upon this vector. Apparently the infection may be airborne and invade through the nasal or conjunctival mucous membranes. Among laboratory personnel at the National Institute of Health 47 cases occurred in 15 months. The course of an attack is not affected by sulfonamides, penicillin nor immune serum, but streptomycin has a curative action in experimental infections in laboratory animals.

The British Medical Journal describes the course and symptoms as follow:

> The incubation period of Q fever is from 12 to 23 dhys. There are at first vague prodromal symptoms, headache, malaise, and general aching, usually for not more than 12 to 24 hours. These symptoms are followed by severe headache, so characteristic of all rickettsial and many virus infections, and sometimes stiffness of the neck. Fever lasts on an average about six days, though some patients may have only one day and others 15 days of high fever, occasionally up to 106° F. (41.1° C.) Rigors and sweats are not uncommon, while generalized aching in the limbs is very frequent. Aching may continue into convalescence. Nausea, vomiting, abdominal pain, diarrhea or constipation are common symptoms, and in nearly a third of the cases there is clinical or radiological evidence of pneumonitis, occasionally with blood in the sputum. No significant or consistent changes are found in the blood picture. A macular rash has very occasionally been seen. It is obvious that the signs and symptoms are such as may be present in many virus and rickettsial infections.

Two explosive outbreaks of Q fever have occurred in the United States: (1) in Amarillo, Texas in March 1946 and (2) in Chicago in August of the same year. Both involved packinghouse employees, principally those handling the viscera of cattle. Ticks were not vectors in these outbreaks.

Q fever is endemic in an intensive dairy section of Los Angeles County, California. The mode of transmission from cows to persons in that area is unknown.

—♦—

Metapon is a recently isolated opium derivative somewhat superior to morphine for the relief of pain. Like other opium derivatives it is habit-forming. Its release is restricted to the use for the relief of chronic pain in carcinoma.

—♦—

An Unfamiliar Mechanism of Disease Transmission

While it is well known that many diseases are transmitted by insect intermediate hosts, it is not so well known that a small group of infectious agents are carried by helminth (worm) intermediate hosts. The three helminth-transmitted diseases to be discussed are blackhead of turkeys, salmon poisoning of dogs, and influenza of swine.

The causative agent of blackhead is the protozoan, *Histomonas meleagridis,* and the intermediate host of this parasite is the common cecal worm, *Heterakis gallinae.*

The exact nature of the causative agent of salmon poisoning is not yet known, though a virus is suspected. Its transmitting host is the fluke, *Troglotrema salmincola.*

Swine influenza is caused by the concerted activity of a bacterium and the swine influenza virus. The virus has as its intermediate host the common swine lung-worm.

It is believed that the three diseases now known to be transmitted by helminths represent only a portion of a larger group and that further investigation of diseases whose epidemiology is still not completely understood will enlarge the group.—*Richard E. Shope,* (Rockefeller Institute for Medical Research) in *Science,* 107, p. 586, 1948

Giving stilbestrol to the egg-laying vertebrates, such as the chicken, pigeon, duck etc. and in frogs and egg-laying fish, results in a marked increase in the blood cholesterol. It does not have this effect in the rat.

Origin of Medical Associations

In ancient Greece, as in western countries much later, the remedies of physicians were carefully guarded secrets. However, claims for their cures were by no means hushed. To support their claims rival doctors debated virtues of their remedies at public meetings. In time the rivals discovered that each learned from the other. So the public was excluded and medical meetings and associations were born.

Penicillin in Intestinal Obstruction

Of 13 dogs, with experimentally induced intestinal obstruction (low ileum), which were given whole blood and gelatin solution intravenously and normal saline solution subcutaneously, all died in 36 hours.

Of 6 dogs given the same treatment but with the addition of 100,000 units of penicillin[1] for a day and 50,000 units for two days, both at two-hour intervals, and 5,000 units thereafter every four hours, four lived over 90 hours. Four of five dogs, receiving the same treatment, in which resection was performed 2 hours after obstruction had been produced, were cured.

J. W. Ward, University of Mississippi, made an internal parasite survey of the carcasses of 24 horses and mules. The ages, at autopsy, varied from 15 days to 20 years. There was no correlation between age and parasite load. Colts only three weeks of age were heavily parasitized with three or more nematodes. Fourteen genera and 19 species were found in the 20 carcasses as follows: *Gastrophilus nasalis, G. intestinalis, Parascaris equorum, Strongylus equinus, S. vulgaris, S. endentatus, Tridontophorus minor, T. serratus, Cyclicocerus goldi, Cyclicocyclus elongatus, C. nassatus, Oxyurus equi, Dictyocaulus arnfieldi, Setaria equina,* Strongyloides sp., Anoplocephala sp., Trichonema sp., Habronema sp., and Gongylonema sp.—*J. of Parasit.* 33, p. 23. 1947.

[1]Blain et al., Surg. Gynec. Obst. 84:753

Leucosis complex caused approximately $50 million loss to poultry farmers in 1946.—*Poultry Tribune.*

Chilling eggs to 30.2°F. and holding them at that temperature up to four hours did not impair the hatchability of eggs in an experiment at the Maryland station. Holding them at near freezing temperatures for 16 hours lowered hatching percentage about 80%.

In a five-year attempt to isolate poliomyelitis virus from other than human sources in epidemic areas, three investigators in the Department of Epidemiology and Virus Laboratory, School of Public Health University of Michigan examined 15,300 living specimens—mammals, birds, insects—and smaller numbers of samples of sewage, sludge, water and milk. Only one specimen, a flesh fly, captured in rural Tennessee, was shown to convey the virus. The investigators concluded: "The best evidence of the transmission of poliomyelitis at the present time supports a person to person transfer."

Different strains of *Trichomonas gallinae* differ greatly in virulence; some cause but slight lesions and no deaths, others cause marked lesions but few deaths and still others nearly 100% mortality. Robert M. Stalker (Colorado College) inoculated eight pigeons, seven weeks of age, orally, with an extremely mild strain of *T. gallinae*. Only one of the eight developed a small, evanescent, canker spot. Twenty-seven days after the first inoculation all were inoculated with an extremely virulent strain of the organism, which killed 12 of 13 control birds. Of the eight birds one developed severe lesions and one slight, short-lived lesions. All lived.

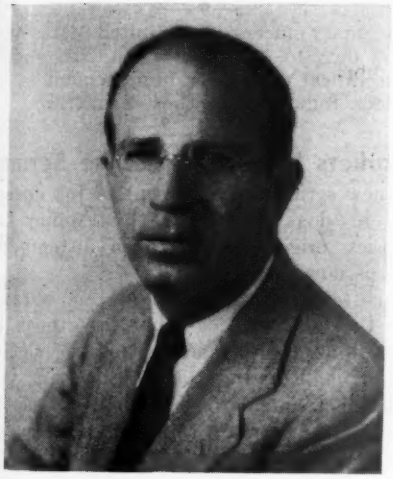
After observing over 75 surgical cases I am convinced that intravenous gelatin can be administered easily and safely to all animals. A special gelatin for this purpose has been proved to be a good substitute for plasma. In animal practice the use of actual plasma is limited because it is often very difficult to find a suitable animal blood donor when urgently needed; and impossible for the practitioner to maintain a plasma bank, especially considering the many species of animals. Further advantages of the use of gelatin for intravenous injections are, it can be stored at room temperature, and carried in the veterinarian's car. Also, gelatin is always ready for immediate use, and the cost is nominal.—Mark W. Allam at Cincinnati A.V.M.A. Meeting.

A Use for Old Veterinary Magazines

The new provincial veterinary college at Saint-Hyacinthe, Quebec, is anxious to establish files of all American veterinary magazines in the new library that it is starting. The school would like to receive back numbers of any veterinary journals that the owners do not care to keep longer, and will pay express charges or refund postage on magazines. Send to *J. Rod. Borduas, Librarian, Ecole de Médecine Vétérinaire* Saint-Hyacinthe, Quebec

Huddleson Brucellosis Vaccine Experiment Undertaken

The livestock sanitary officials of five states — West Virginia, Maryland, Ohio, Pennsylvania and Virginia — have organized



I. Forest Huddleson

a cooperative experiment to determine the value of Huddleson's mucoid brucellosis vaccine.

Dr. T. C. Green, state veterinarian of West Virginia, is director of the experiment and the state veterinarians of the other cooperating states are associate directors. R. J. Funkhouser, an indusrialist, has supplied a 160-acre farm with all facilities for the project and contributed $20,000 for the purchase of livestock, including 65 heifers eight to ten months of age selected from brucellosis free herds.

A technical committee comprising B. H. Edgerton, Ohio; W. L. Bendix, Virginia; N. O. Olsen, West Virginia; I. D. Wilson, Virginia; W. B. Bell, Virginia; A. L. Bruekner, Maryland; and L. J. Poelma, Maryland, will assist the director of the project.

New Appointment to U. P. Faculty

A new addition to the faculty of the College of Veterinary Science, University of the Philippines is Dr. Jose B. Aranez, Class 1946 from Tanauan, Batangas. His appointment in the Department of Veterinary Surgery and Medicine was approved by the University Board of Regents at a meeting in June. Doctor Aranez, who comes from Tanauan in the province of Batangas (S. W. Luzon) had already passed his license and civil service examinations, before the meeting of the Board of Regents. Presently he is the youngest and the only bachelor member of the college faculty. He is a member of the A. V. M. A. and resident secretary for the Philippines.

Jose B. Aranez

First International Congress on Animal Reproduction

The first International Congress of Physiology and Pathology of Animal Reproduction and Artificial Insemination was held in Milan, Italy, June 23 to 30, 1948.

Delegates from six continents and 35 nations attended. Of a total attendance of 600 approximately 300 were from abroad; the remainder from Italy. More than 250 papers were presented at the Congress.

It was decided to make the Congress a permanent organization and to hold the next meeting in 1951. A permanent committee of nine from nine different countries was appointed to manage the affairs of the Congress and to arrange for the next meeting. Pro-

fessor T. Bondonna, Director of Institute "Spallanzani", Milan, Italy, was made Secretary of the Permanent Committee of the Congress.

Dog Motion Picture Film Available to Veterinarians

"Partners", a new 22-minute sound motion picture spotlighting the variety of interests shared by dogs and mankind, is being released by the Ralston Purina Company, makers of Purina Dog Chow, St. Louis, Mo. The film was previewed by prominent dog publications and sports writers and editors in Chicago, July 12.

With amazing motion pictures of dogs in action as farm and range shepherds, hunters

THE HUNTER AND HIS DOGS
The scene above, showing a hound hunter reflecting on the glories of his sport, is taken from the new sound movie, "Partners"

and game retrievers, seeing eyes for the blind, pets for young and old and in many other sequences, the film is expected to prove of equal interest to professional dog breeders and trainers and to the general public.

Interesting scenes of several breeds of dogs in action under a variety of circumstances have been captured on film with great fidelity. A well-woven narration has knitted the wide range of the subject into a fast-moving, direct presentation of dogs' loyalty, ability and training.

Among the many scenes in which dogs are shown, coon hunting, fox hunting, rabbit hunting, racing, retreiving, driving sheep, in training, before the fireplace, is one of a boy and his dog at a veterinary hospital to have a fracture reduced. The boy's gratitude when assured his pal will be all right again is splendidly portrayed.

The film is a desirable one for veterinarians to show at Kiwanis, Rotary and other business and civic meetings. It contains practically no advertising except the name of the producer, is good entertainment and presents veterinary service in a desirable way.

Films are made available to organizations of all kinds without cost. Officers and program committees of all kinds will welcome this new and interesting film for the variety it will lend to club meetings. A copy of the 16 mm. sound-on-film movie has been supplied to each of Purina's 400 field men. A showing can be arranged by contacting local Purina dealers or by writing direct to Ralston Purina Company, Checkerboard Square, St. Louis, 2, Mo.

Veterinary officers of the United States Army are on duty in five foreign countries supplying technical advice for improvement of the livestock industries of those countries.

Markets New Dog Disease Serum

A new serum for treatment of fox encephalitis in dogs*, developed by Fromm Laboratories, originators of Green distemperoid virus, is now available.

This serum (canine origin), is obtained from the blood of dogs that have been hyperimmunized with repeated doses of virulent fox encephalitis virus.

Although similar to distemper, fox encephalitis is much more rapid in its progress. Dogs usually succumb to the infection from five to 10 days after exposure.

Onset of the disease is accompanied by a high fever of 104°F. The dog may or may not go off feed. About five days after exposure, the dog becomes sluggish, has a watery discharge from eyes and nose, which becomes purulent, increased saliva.

About 50% of dogs infected develop neurological symptoms, from champing of the mouth to violent convulsions. The other 50% simply show excitement and frenzy. Lethargy is common just before death. Investigations indicate that a 30 to 35% mortality is common. This mortality increases in young puppies.

The new serum is available to veterinarians from Winthrop-Stearns, Inc., New York.

*Encephalitis in The Fox and The Dog, Chaddock, T. T., Vet. Med. 42:12, pp. 475-478.

USE OF B VITAMINS IN STANDARDBRED HORSES
(A Preliminary Clinical Report)

By JOHN RAE STEELE, D.V.M.
Saratoga Springs, New York

VERY little work on the vitamin B-complex requirements of horses has been done. Pearson[1] has found that riboflavin and pantothenic acid are necessary for normal growth and health of the horse. On diets ficient in these vitamins, ponies lost weight and developed a severe diarrhea. When these nutritional factors were given to the animal, either by injecting synthetic vitamins or by feeding brewer's yeast as 10% of the grain ration, the animals began to gain weight and recovered from the diarrhea. Carlstrom, Burger, and Hjarre[2] have reported that a lack of the B-complex vitamins in the diet of the horse will cause nervous symptoms. They also reported good clinical results when vitamin B-complex concentrates were given animals on "poor" diets. Way[3] has found that vitamins, particularly the B-complex vitamins, are indicated for Thoroughbreds which naturally are subject to extreme nervousness, anorexia, certain types of paralysis, muscular fatigue, and a condition in animals commonly described by horsemen as "not doing well". This finding is supported by the work of Spies *et al*[4], who, in their work with vitamins in humans, indicate that water soluble vitamins should be administered together rather than individually in the treatment of deficiency states.

The following case reports are from work that was done on Standardbred horses during 1947. These horses that were treated were used for harness racing. The vitamin product, Lyo B-C*, was administered intravenously for the treatment of muscle cramps, chronic indigestion, as a tonic for horses commonly described by horse fanciers as "not doing well", and in two cases as an adjunct in the treatment for pneumonia.

Case No. 1.—A four-year-old, black, Standardbred stallion had a record of subnormal performance as a four-year-old. He ate well and seemed normal in all respects except that he was unusually quiet and docile for a stallion. When this animal was taken on the track he did not show the endurance and speed that he had shown as a three-year-old. At the end of a workout he did not have the stamina necessary for a fast finish. In the stable he was very quiet and in contrast to most stallions, showed very little signs of animation. He often stood with his head in the corner, ears down, acting depressed and languid. Examination of his blood and urine showed no signs of any abnormality. Fecal examination for intestinal parasites was negative.

Since the owner was anxious to get him back to his normal vigor and in top form, vitamins were administered over a period of two weeks. Twelve doses were given intravenously, six during the first, and six during the second week.

Ten days after the treatment was begun the animal appeared much more alert and was interested in his surroundings. He began to show the usual behavior of a stallion. In workouts he showed more speed, stamina, and endurance. The vitamin therapy appeared to have helped in building up the vitality of the horse.

Case No. 2.—A bay, Standardbred gelding was brought to New York state from a stock farm in Kentucky when he was two years of age. At this time the animal was in poor physical condition and was subject to repeated attacks of diarrhea and colic with intestinal stasis and tympany. Associated with the conditions the animal had periods of anorexia lasting for four or five days. These attacks were frequent and severe. Often during an attack he would lie in the stall with his head in the flank, acting very depressed. He responded slowly when disturbed. It is interesting to note that during the animal's life he changed owners many times because of unthriftiness, accompanying the previous conditions.

The horse was seen as a three-year-old in midsummer of 1947. These attacks of illness appeared to have some relationship to exercise. This, however, was not always true. Blood, urine and feces were examined. The blood and urine appeared to be normal and

*Each vial was restored with 5cc of sterile distilled water and contained the following: thiamine HCl 100mg, riboflavin 10mg, pryidoxine 10mg, calcium pantothenate 50mg; niacinamide 250mg ascorbic acid 200mg. "Lyo-B-C" is the registered tradename of this Sharp and Dohme product. The material used in this investigation was kindly furnished by the Sharpe and Dohme company.

examination of the feces revealed only a few strongyle ova. Rectal examination revealed no evidence of aneurysm of the blood vessels.

A qualified diagnosis of chronic indigestion was made. At the request of the owner, the horse was treated with phenothiazine for intestinal parasites. Two tablesponfuls of equal parts of charcoal and sodium bicarbonate were added to the grain the horse received twice a day. In addition the vitamin B-complex medication was administered intravenously over a five-week period. During the first week five doses of 5cc each were given on consecutive days; in the second week three doses were given at 48-hour intervals; in the third week a double dose was given in the middle of the week. During the fourth week, three doses were administered at 48-hour intervals.

After 10 days of treatment the animal began to show improvement; the appetite increased. The attacks of colic and diarrhea stopped. From this time on he began to gain weight. At the end of the five-week period of treatment he had gained about 200 pounds. The extreme gauntness had disappeared and the horse was far more active. About two-and-one-half weeks after the treatment was started he was worked and seemed to have little adverse effect from the exercise. At this time he showed signs of improvement and had more endurance and speed than he had shown at any time during his prolonged sickness.

Six weeks from the time treatment was begun the animal showed such a marked improvement that he was considered to be in condition for racing and was started successfully during the following six weeks. It is reasonable to conclude that the treatment employed helped in the recovery of the animal.

Case No. 3.—An aged, bay, Standardbred mare was given complete rest for three days after participation in a race. She was then given moderate exercise for a distance of three miles. A few minutes after bringing her back to the barn her gluteal muscles became cramped. They were rigidly contracted and were sore and hard when touched. The animal had difficulty in walking. At frequent intervals she voided small amounts of dark coffee-colored urine.

A diagnosis of "muscle cramp" was made. Two hundred cc of 20% calcium gluconate solution and a double dose of the vitamin preparation were injected intravenously. Twelve hours later two additional doses of the vitamin preparation were given. The following day the animal seemed improved since she had less trouble in walking, and had a normal gait. A diuretic, Uva Ursa, also was given during the first two days of treatment. On each of the following three days one dose of the same vitamin preparation was given. At the end of this time the horse was much improved. The muscles were relaxed and showed no further signs of spasm and cramping. The animal was exercised regularly after this and had no recurrence of the condition.

Case No. 4.—An aged, bay, Standardbred mare participated in two very fast heats the day she was moved to another track. The horse was "cooled out", loaded in a truck, and taken a distance of 200 miles to another stable. The next day her rear quarters were stiff; and the gluteal muscles were cramped. The attending veterinarian treated her with calcium gluconate and a large dose of thiamin hydrochloride. The animal did not show much improvement. At the time the mare was seen she walked with abnormally short steps as the muscles over the rump were cramped. She had had moderate exercise since the treatment with calcium gluconate and thiamin hydrochloride.

Lyo B-C was given intravenously over a period of three weeks. The first four days, two daily doses were given. On the fifth day, the mare was exercised, after which she again became stiff. During the subsequent four days the same dosage was given. For the next seven days one dose was given each day. The mare was exercised moderately after this and she showed no further signs of having muscle cramps.

In this animal the course of illness was observed for a longer period than in other cases. In about 10 days definite improvement was seen and the muscles appeared relaxed but following exercise there was evidence of cramping for a short period. Eighteen days following the inauguration of treatment the animal showed no further signs of cramping in the gluteal muscles. Moderate, and later strenuous, exercise caused no untoward reaction.

Case No. 5—A four-year-old, chestnut Standardbred mare raced on each of two

days before evidence of illness was noted. She had not received any exercise since the last race until about two hours previous to the attack of muscular cramps, when she was "jogged" slowly for a distance of two miles. When the mare was taken into the barn she showed a very stilted, short gait in her hind legs. The muscles in the gluteal region were contracted and very rigid, causing difficulty in walking.

Two hundred cc of 20% solution of calcium gluconate and two doses of Lyo B-C were given intravenously. The animal was rested a day and two more doses of the vitamin preparation were administered. The following morning she was exercised and showed improvement; the muscles, however, were cramped to some extent, although they relaxed when the animal was walked. The animal was turned out on pasture and no further treatment was given. Recovery was uneventful.

Case No. 6.—An aged, bay, Standardbred gelding won a fast heat. He was exercised three days later, and became sick four days later while being prepared for another race. As the horse was being "warmed up" in the preparation for the race, he exhibited profused sweating, showed a fast weak pulse, very rapid respiration, a normal temperature, and showed evidence of fatigue. The large muscles over the rump were cramped and rigid. He walked with the characteristic gait of a horse with cramps in the gluteal muscles.

A heart stimulant was administered intramuscularly. Auscultation over the abdomen revealed evidence of intestinal tympany. Two ounces of a carminative containing turpentine, capsicum, and salicylic acid were given by mouth and two doses of the vitamin preparation were given intravenously; this was repeated after 24 hours. On the third day the horse was exercised and when returned to the barn seemed perfectly normal. Since it was near the end of the season the animal was not raced again. However, he was exercised periodically and showed no signs of recurrence of this condition.

Case No. 7.—A two-year-old, bay Standardbred gelding had been worked repeatedly during the season. After the last race he was rested for two weeks and only limited daily exercise was given. For two days prior

TABLE I.—A SUMMARY OF THE SYMPTOMS, TREATMENT, AND OUTCOME OF EIGHT TYPICAL CASES OF MUSCLE CRAMPS

Case	Symptoms	Treatment	Results
1 - Standardbred Stallion	Depressed, languid, and poor performance on the race track.	'Lyo B-C' - 12 I.V. doses in 14 days.	Recovered
2 - Standardbred Gelding	In poor flesh, tympany and intermittent diarrhea. Chronic catarrhal enteritis. Strongylidosis.	Phenothiazine for strongyles. 'Lyo B-C' - 13 I.V. doses over a period of 4 weeks.	Recovered. Animal gained 200 lb. and raced successfully in succeeding wks.
3 - Standardbred Mare	Gluteal muscles rigidly contracted. Muscles very sore and hard when palpated.	Calcium gluconate 20% soln. admin. I.V. 'Lyo B-C' - 7 I.V. doses admin. over a period of 7 days.	Recovered.
4 - Standardbred Mare	Gluteal muscles severely cramped.	Calcium gluconate and thiamin HCl treatment without results. 'Lyo B-C' - 23 I.V. doses admin. over a period of 11 days.	Slow but complete recovery.
5 - Standardbred Mare	Gluteal muscles severely cramped.	Calcium gluconate 20% soln. Admin. I.V. 'Lyo B-C' - 4 I.V. doses admin. over a period of 2 days.	Recovered.
6 - Standardbred Gelding	Severe prespiration, rapid and weak pulse, normal temp. Showed great fatigue. Gluteal muscles cramped.	Carminative. 'Lyo B-C' - 4 I.V. doses admin. over a period of 3 days.	Recovered.
7 - Standardbred Gelding	Gluteal muscles severely cramped and painful on palpation.	'Lyo B-C' - 10 I.V. doses admin. over a period of 5 days.	Recovered.
8 - Standardbred Mare	Both hind legs stiff. Gluteal muscles cramped.	Calcium gluconate 20% - 200 cc. admin. I.V. 'Lyo B-C' 4 I.V. doses admin. over 2 day period.	Recovered

to his illness he was not out of the stable. Following this complete rest again he was given the usual exercise. About five minutes after being returned to the barn the gluteal muscles became cramped. The attending veterinarian treated this horse with calcium gluconate. He gave instructions that the horse be given a laxative, a diuretic for several days, and exercised moderately two days later. The horse was seen after the exercise. He again suffered with muscle cramps. The muscles over the rump were rigid, contracted, and painful on palpation. He walked with a short stride in the hind legs.

Three doses of Lyo B-C were given intravenously during the first day; and on the second day two more doses were administered. The animal was rested that day. On the third day he was taken out and exercised when he again showed evidence of cramps in the gluteal muscles. The animal felt much better, however, on this day, as was shown by the fact that he appeared quite energetic during his period of exercise. Three doses of the vitamin preparation were administered after this workout. On the next day two more doses were given. The horse appeared very much improved and showed no further signs of muscle cramps.

This result was very gratifying. Evidently treatment with calcium gluconate alone did not give an adequate result since the muscle cramps recurred following this medication. The B-complex vitamins appeared to prevent the recurrence of the condition following administration over a period of three or four days.

Case No. 8.—A four-year-old, chestnut, Standardbred mare participated in a heat in which she improved her record by two seconds. Two days later she was exercised in preparation for a race, but did not seem to have her normal stamina and endurance. The animal was raced in spite of this, but did very poorly. The next morning she could not walk normally. Both hind legs were stiff because the muscles over the rump were rigid and cramped.

Two hundred cc of 20% solution of calcium gluconate and two doses of Lyo B-C were given intravenously. The following day a double dose of the vitamins was administered. By the end of the second day the animal was very much improved; the muscles were relaxed and appeared normal, although there was evidence of stiffness. During the succeeding days she improved and recovered completely.

Following the administration of four doses of the vitamin preparation and calcium gluconate this animal recuperated rapidly. The muscles were relaxed, no further signs of cramping were evident.

Summary

A stallion in poor condition and a gelding with chronic indigestion and diarrhea were treated with B-complex vitamins (Lyo B-C). Six cases of muscle cramps in horses in training appeared to benefit by treatment with this preparation. The drug was used also as an adjunct in the treatment of two cases of pneumonia not described herein, and seemed to have a beneficial effect in bringing about a rapid recovery.

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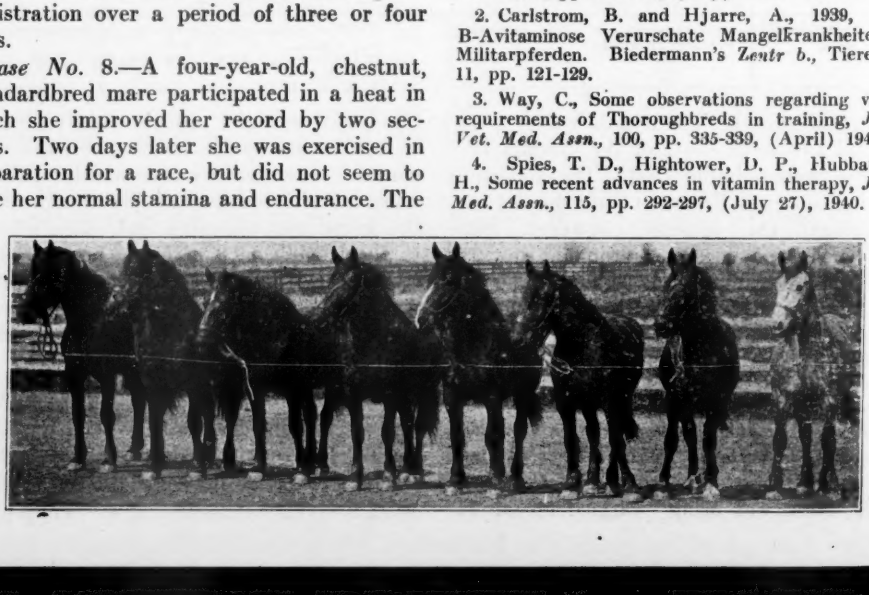

Bovine Leptospirosis*

By LEE M. RODERICK, D.V.M.**
Manhattan, Kansas

A severe form of bovine hemoglobinuria appeared in Kansas in 1941. It was encountered over a wide area and was likewise reported in the adjoining states. It was reported by Folse[1], Christian, Cloud *et al.* in Texas and studied by Smith[2] in Oklahoma about the same time. It was reported in quite a number of herds in the next two or three years so that it came to the College Clinic and Laboratory rather frequently. It has been observed only occasionally, however, during the last three or four years, although practitioners have encountered it from time to time.

A number of papers by Russian research workers appeared between 1935 and 1942 in which they incriminated an infection with leptospira as the cause of a specific disease in cattle. The symptomatology and pathology described in their papers were quite similar to those observed in the hemoglobinuria occurring in this area. Leptospirosis in cattle was reported by Jungherr[3], Connecticut, Mathews[4] studied it in Texas, the report by Marsh[5] from Montana lists the essential references, and the condition has been reported in Illinois[6]. Furthermore, some papers on bovine leptospirosis have recently been published by research workers in Palestine,[7,8].

We did not succeed in demonstrating the leptospira in the material from the cases of hemoglobinuria submitted to this laboratory and all attempts failed to transmit the condition to cattle and laboratory animals. The condition occurring in Kansas seems to correspond to that studied by Marsh and Mathews. Smith likewise failed to reproduce the condition in cattle and experimental animals. We have, however, had little opportunity to work on it recently. The Palestine investigators succeeded in transmitting the disease through six passages in calves. There seems to be some variation, however, in the clinical features and the pathology observed in Palestine and in Kansas. They emphasized the icterus, while the hemoglobinuria received little comment. They encountered a moderate degree of anemia but the severe hemoglobinuria so regularly encountered here is not even mentioned. They describe a bilirubinemia but in our material, any obvious increase in bile pigment was completely masked by the free hemoglobin. They pointed out the probability that more than one type or strain of leptospira may be pathogenic for cattle and because of its pathogenicity for man, the disease is of public health significance. A chronic form seems to have been encountered in Palestine but here the disease has been rapidly fatal within about four days. At present, the preponderance of the evidence, therefore, appears to be that the bovine leptospirosis encountered in Palestine and the hemoglobinuria in cattle which is occasionally seen in Kansas and adjoining states are due to different types or strains of Leptospira.

Clinical Diagnosis.—While hematuria and hemoglobinuria may occur occasionally under a variety of conditions, there is ordinarily no difficulty in the clinical diagnosis of this condition. There is depression, rapid respiration and pale mucous membranes. An elevation of temperature to 104 to 105°F. is not always observed, but may be only an early feature of the disease. Anaplasmosis is rarely if ever accompanied by hemoglobinuria. Bacillary hemoglobinuria does not seem to have been encountered or definitely identified in this area. The significant liver lesions observed in that condition have not been found in the material studied in Kansas. Poisoning from sodium chlorate should be ruled out. While there is blood as well as pus in the urine in pyelonephritis, that is more of an individual cow problem.

Occurrence.—Leptospirosis has been encountered at all seasons of the year. It has appeared on pasture and in barn lots during the winter and spring months. It has involved as many as 35% of the herd and has occurred in calves three weeks of age as well as cattle of all ages. The mortality has been high in our experience. Probably 80% of the untreated clinical cases have died.

Gross Pathology.—Many times there are few significant gross lesions other than the presence of the bloody urine. The carcass is pale and anemic for the animal has literally bled out through the kidneys. Those

*Discussion presented at the Midwest Veterinary Conference, Kansas City, Missouri, June 29, 1948.
**School of Veterinary Medicine, Kansas State College.

organs seem most frequently to be of a dark reddish brown color. The cattle die because of the destruction of the red cells in the circulating blood. When the blood is centrifugalized, it may show either a red plasma or almost complete destruction of the erythrocytes. Icterus has been rather rare in our cases although we saw it in animals which survived some days. The liver is usually a tawny color and the gall bladder may be distended with a viscid bile. There is considerable damage to both the liver and kidneys but it is scarcely demonstrable except under the microscope. Subserous hemorrhages are rare. There is a nominal swelling of the spleen so often seen in diseases accompanied with an unusual destruction of blood.

Admittedly many gaps still remain in our knowledge of this problem. While the presence of the hemoglobinuria is significant, the ultimate diagnosis depends on the finding of the causative organism and that is a problem for the laboratory and it is not always feasible. Urine samples may be submitted but they must be collected in a cleanly manner. They should be refrigerated and delivered to the laboratory without delay. Portions of liver and kidneys are the materials of choice for examination. Larger portions should be furnished if they can be delivered at once. If time will be required in transportation, thin slices of liver and kidney, 2 to 5mm in thickness should be preserved in 10% formalin solution.

Control Measures.—These sick cattle are desperately in need of red cells to replace those destroyed by the hemolysis, so our clinicians have resorted to blood transfusions with a fair degree of success. Penicillin seems to be in favor for canine leptospirosis. If a further parallel is drawn between the prevention of leptospirosis in dogs and cattle, there is the need for a sanitary water supply. The disease appeared in a herd of cattle on a pasture through which flowed a sluggish stream. The losses were checked when the cattle were moved to another pasture. New cases then appeared when the cattle returned to the original pasture. There seems to be no significant observations on the sources of new infection nor the means of spread to other herds. Nevertheless, the isolation of the infected animals is indicated as a general sanitary precaution.

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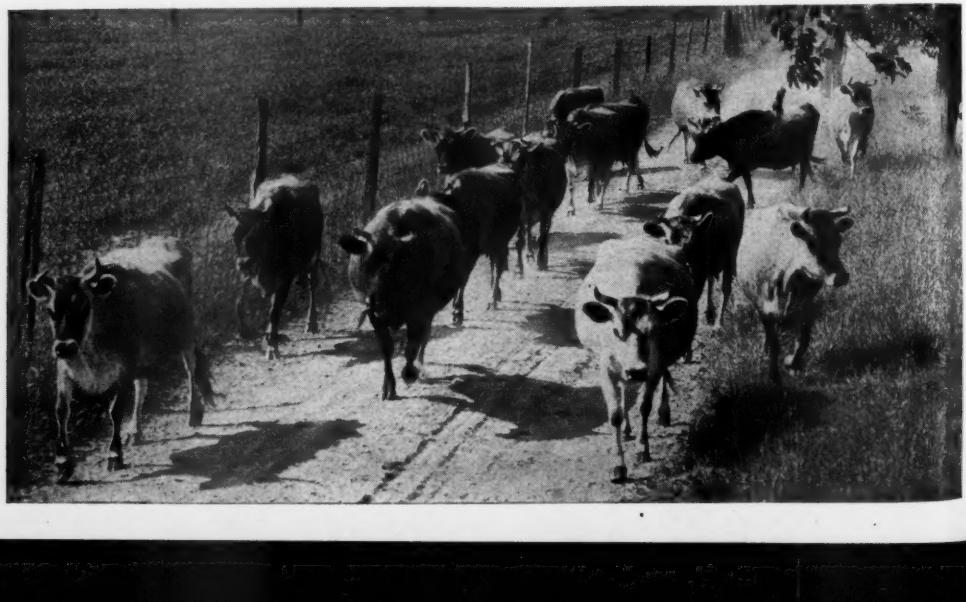

Comparative Fasciolicidal Efficacy of Hexachloroethane and Carbon Tetrachloride in Animals

By O. WILFORD OLSEN*
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SINCE the discovery that carbon tetrachloride[4] and hexachloroethane[8] possess important fasciolicidal properties, these drugs have been used extensively for removing liver flukes (*Fasciola hepatica*) from sheep[5] and cattle[6].

Inasmuch as no experiments of a critical nature appear to have been conducted to determine the comparative fasciolicidal efficacy of these two drugs in sheep, it is the purpose of this article to report the results of a limited number of such tests.

Review of Literature

Montgomerie[4] demonstrated that 1cc of chemically pure carbon tetrachloride per sheep was an efficacious and relatively safe fasciolicide. The commercial grade of the drug, however, gave variable results, with large numbers of flukes surviving medication in some instances.

Klobouk[3] stated that hexachloroethane dissolved in ether or benzol was the drug of choice for removing liver flukes from sheep, when given to fasted animals at the rates of 0.18, 0.2, or 0.3 gram per kilogram of body weight. Hilz and Scheuble[2] reported variable results with no complete kills of flukes from single doses of (a) 10 grams of the drug in crystalline form or dissolved in acid ether, (b) 12:5 grams dissolved in benzol, or (c) 15 grams mixed with sugar. The drug was highly efficacious, however, when given in single doses of 15 and 16 grams dissolved in acid ether or in doses of 22 grams of the crystals mixed with sugar, or in 10-gram doses of the crystals on two consecutive days. It was toxic in doses of 35 grams.

Ganslmayer and Grmovsek[1] stated that hexachloroethane in tablets gave variable results in one, two, and four-gram doses, but was more effective at the rates of six, eight, or 10 grams per sheep, especially the latter two doses. One six-gram tablet given on two consecutive days was markedly efficacious. Stauffer, Mugaburu, and de Castra[7] found 20 and 30-gram boluses of hexachloroethane alone, or combined with five and 7.5 grams, respectively, of bentonite, to be highly effective.

Olsen[5] reported that a single dose of 30cc of hexachlodethane-bentonite suspension, containing 15 grams of the drug, was effective in destroying adult flukes, whereas 60cc doses killed all mature worms.

Material and Methods

The results reported in this study are based on comparative critical tests conducted on 10 fluky sheep, five of which were drenched with the 30cc of hexachloroethane-bentonite suspension containing 15 grams of the drug, and five given 1cc of chemically pure carbon tetrachloride prepared commercially in soft gelatin capsules. The sheep were paired on the basis of weight and fluke infection, the latter being determined by egg counts. It was not possible in all cases, however, to carry them through the experiment as originally paired, due to the development of clinical fascioliasis in several individuals. This necessitated completing the experiment as quickly as possible to avoid loss by death. The animals were kept on pasture and medicated without previous fasting. No untoward effects resulted from the use of either drug.

The droppings were collected in canvas bags (Fig. 1), which were changed twice daily. The pellets were comminuted six to

Fig. 1 Canvas bags attached to sheep for collecting feces.

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14 hours in 0.4 N sodium hydroxide solution after which they were washed through a 20 and a 40-mesh-to-the-inch screen, and all flukes collected and counted. Three to six days after medication (Table I) the animals were slaughtered, and the liver and intestines examined for flukes.

TABLE I.—DATA FROM COMPARATIVE CRITICAL TESTS OF THE FASCIOLICIDAL EFFICACY IN SHEEP OF 30 CC OF HEXACHLOROETHANE-BENTONITE SUSPENSION (CONTAINING 15 GRAMS OF DRUG) AND 1 CC OF CHEMICALLY PURE CARBON TETRACHLORIDE IN SOFT GELATIN CAPSULES.

Sheep No.	Wt. (lbs.) of sheep	Eggs per gram of feces	Medicament	Flukes in feces after treatment: Number on successive days						Total	Flukes in liver at postmortem: dead	living	Total number of flukes destroyed	Efficacy (percent)
26		416	CCl_4	40	35	4	0	0	0	79	0	2	79	97
22		840	C_2Cl_6	7	4	52	64	42	14	183	20	8	203	96
6	75	408	CCl_4	3	7	6				16	4	14	20	58
32	100	236	C_2Cl_6	6	53	7				66	1	4	67	94
5	60	336	CCl_4	27	22	6	0	0		55	0	4	55	93
13	65	360	C_2Cl_6	0	68	100	27	0		195	6	1	201	99
14	85	264	CCl_4	0	42	5	0	0	0	47	0	0	47	100
28	85	304	C_2Cl_6	13	59	19	2	0	0	93	14	50	107	68
21	80	552	CCl_4	2	6	0				8	3	1	11	91
8	95	316	C_2Cl_6	35	54	0				89	1	0	90	100
Totals & mean percentage (CCl_4)				72	112	21	0	0	0	205	7	21	212	91
Totals &mean percentage (C_2Cl_6)				61	238	178	93	42	14	626	42	63	668	91

Experimental Data

The results of the tests, as given in Table I, showed that single doses of 30cc of hexachloroethane suspension and 1cc of chemically pure carbon tetrachloride possess approximately equal fasciolicidal efficacy in sheep. An average of 91% of the flukes were removed in both cases. The results may be summarized as follows: In one sheep from each group, all the flukes were killed; in three sheep carbon tetrachloride removed 91 to 97% of the worms, and in three sheep hexachloroethane removed 94 to 99%; and in one animal

Fig. 2. External surface of gall bladder of Sheep No. 28 showing extreme connective tissue proliferation which resulted in its adhesion to hte colon.

Fig. 3. Internal surface of gall bladder (Sheep No. 28) showing malformation, including crypts and extensive thickening of wall.

carbon tetrachloride killed 58% of the flukes and in another hexachloroethane killed 68%.

The failure of each drug in one instance to kill a large percentage of flukes is of interest. In the case of carbon tetrachloride, there was no apparent cause why so few flukes were destroyed, as the liver of this animal (No. 6) was almost normal and quite similar in appearance to those of the other sheep medicated with the same drug. Inasmuch as all the flukes in apparently normal gall bladders of sheep drenched with hexachloroethane suspension were killed, there is reason to believe that the survival of 48 to 50 flukes in that organ of sheep No. 28 was associated with its severe lesions and malformation (Figs. 2 and 3). Moreover, the two dead flukes indicated that while movement of medicated bile into and from the gall bladder did take place it was on a very limited scale.

Carbon tetrachloride produced its maximum lethal effect very soon as indicated by the number of flukes recovered from the feces the first and second days after medication, as compared with subsequent days (Table I). Hexachloroethane, on the other hand, was slower in producing its maximum effect. The kill with this drug extended over a longer period, as the greater proportion of the flukes generally were eliminated on the second and following days after medication. Flukes appeared in the feces about 19 hours after medication in the case of both drugs.

Inasmuch as no immature flukes were present in these sheep, no observations regarding their resistance to the drugs were made.

Summary

1. When examined by critical tests in sheep, 1cc doses of chemically pure carbon tetrachloride in soft gelatin capsules, and 30cc doses of hexachloroethane-bentonite suspension containing 15 grams of the drug, were both equally efficacious in destroying adult liver flukes. Young flukes were not present in the sheep.

2. In one sheep from each group, all the flukes were killed; in three sheep carbon tetrachloride removed 91 to 97%, and in three sheep hexachloroethane removed 94 to 99% of these parasites; in the remaining sheep from each group, carbon tetrachloride destroyed 58% and hexachloroethane 68% of the flukes.

3. While both drugs were equally efficacious, it is significant that four of the five test animals from each group remained infected and continued to pass eggs.

4. No reason, on the basis of liver involvement, could be found for the low percentage of flukes killed by carbon tetrachloride in one animal. In the case of hexachloroethane, however, 48 of the 50 surviving flukes in one sheep were found in the gall bladder which had undergone extensive pathological malformation.

5. Dead flukes appeared in the feces 19 hours after medication, indicating that the drugs were absorbed and the flukes killed promptly after medication.

6. The maximum lethal effect of carbon tetrachloride occurred sooner than that of hexachloroethane, as indicated by the appearance of the flukes in the feces.

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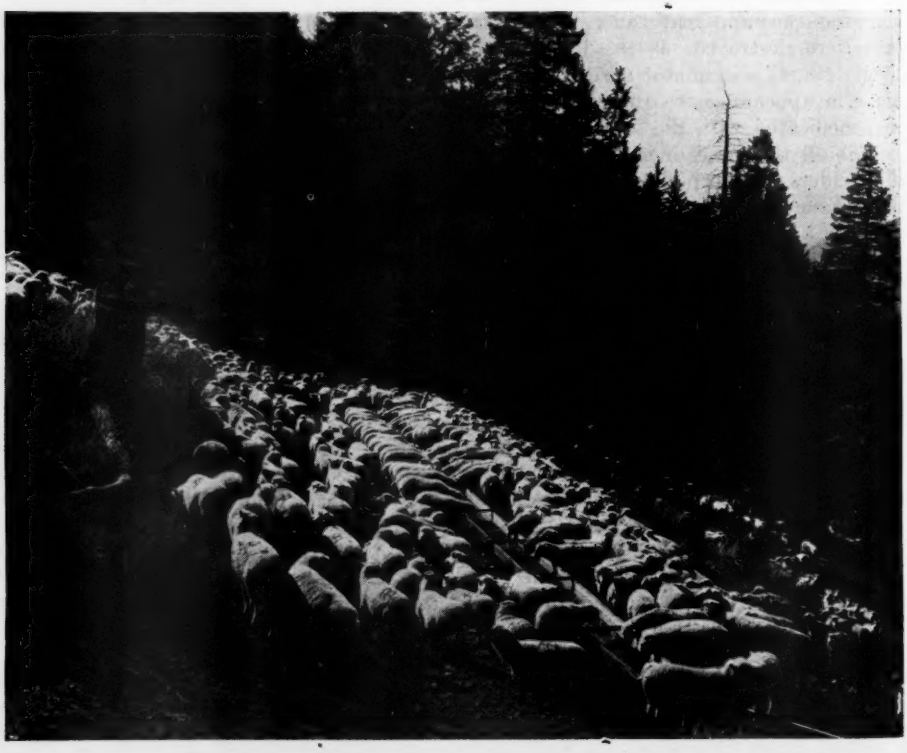
Best Control of Sheep-Ticks

Dipping of sheep for control of the sheep-tick or ked gave more satisfactory results than spraying in USDA tests conducted recently near Corvallis, Oregon. Rotenone was found to be the most economical and safest insecticide for sheep-tick control. These tests started November 1947 and continued until shearing time last spring.

The dipping tests revealed that a mixture of eight ounces of derris or cube powder containing 5% rotenone gave 100% control of sheep-tick that lasted for 110 days after dipping. Similar results were obtained by the use of low concentrations of benzene hexachloride, chlordane, and chlorinated camphene. Wettable powders were used in all tests. Rotenone gave virtually the same results as chlorinated compounds and cost 10 to 20% less. Dipping was more effective than spraying in heavy fleeced sheep.



PRIMARY IDIOPATHIC APLASTIC ANEMIA IN A PUPPY

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JACK O. KNOWLES, V.M.D.
ROBERT P. KNOWLES, D.V.M.
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MARCH 6th, 1948, an unspayed, female Scotch Terrier, seven months of age, was presented for examination. The history was, as usual, sketchy. The animal had been on an adequate diet and had received, generally, good care. For the past three days she had not eaten and was listless.

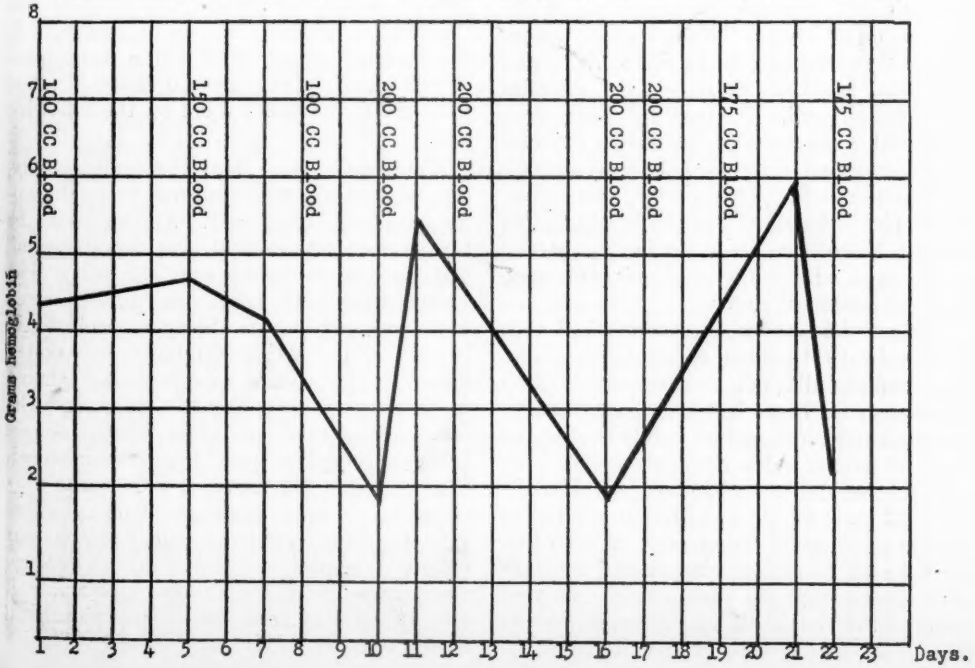
A complete blood count revealed:

RBC	2,230,000
WBC	6,450
HGB	4.37 gm
CI	0.7gm
Piroplasmosis, negative	
Differential:	
Seg.	22%
Stab.	42%
JU	5%
Lymph	29%
EO	1%
BA	1%
Anisocytosis, microsytosis, few poikilocytes.	
Schilling Index	2.3/22
Sed. rate (Cutler not corrected) 18mm in one hour.	

Upon examination, the patient was found to have a temperature of 102.8° F. She was well-fleshed, weighed 15 pounds, and the hair coat was rough, but with no alopecia. The visible mucous membranes were quite pale. The feces had a particularly offensive odor. Fecal examination for intestinal parasites was repeatedly negative. The spleen was barely palpable.

A diagnosis of acute anemia was made with a tentative diagnosis of virus complication. The animal was given an enema, placed on 300,000 units of penicillin in oil and wax, intramuscularly, every 24 hours, given folic acid (3.14mg) and 1gm ferrous sulfate daily plus solulexin and 20 units of concentrated liver extract, intramuscularly. March 7th, after the owner's permission had been obtained, a blood transfusion was administered consisting of 100cc of freshly drawn, citrated blood. Treatment was continued until March 11th, at

CHART SHOWING RELATIONSHIP OF HEMOGLOBIN IN GRAMS TO BLOOD TRANSFUSION



which time a blood count revealed—

RBC (unable to obtain unclotted blood with pipette)
WBC 5,500
HGB .....4.65 gms.
Piroplasmosis, negative
Differential:
Seg. 34%
Stab. 28%
JU 2%
Lymph 35%
EO 1%
Anisocytosis, approximately ½ microcytes and ½ macrocytes. Some poikilocytes.
Schilling index, approximately 15/17.

On this date, penicillin was discontinued and 0.5gm of streptomycin was administered intramuscularly, divided into four daily injections. The temperature had gradually increased to 104.4° F. on this date. March 13th the hemoglobin was 4.13gm. The appetite continued good although the patient had lost ¾ of a pound in weight. The spleen, at this time, was easily palpable and seemed to be increasing in size rapidly.

March 14th, another 100cc of blood were administered. Streptomycin was continued until this date with no appreciable temperature change, then discontinued. March 16th, hemoglobin was 1.83 grams. Another transfusion, 200cc of blood was given and, although no parasites could be demonstrated in blood smears either circulating or peripheral, acalprin was administered. The dosage of ferrous sulfate was increased to 25 grains daily and additional injections of B complex vitamins were administered. The patient, at this time, evidenced some pain at defecation. Fluoroscopic examination revealed the presence of a straight pin in the pelvic cavity. Soft tissue X-ray plates demonstrated the head of a pin lying in the rectum about six inches anterior to the anus, with the pointed end protruding into the peritoneal cavity.

The possibility of a splenectomy had been discussed with the client, although the laboratory findings did not conclusively indicate splenomegalia. There had been no hematuria nor hemoglobinuria and no visible icterus, nor was the icterus index elevated.

With considerable reluctance, we administered 0.5 grain morphine with 0.01 grain atropine in preparation for surgery. A well lubricated anal speculum was inserted into the rectum and the pin, fortunately, removed through the anus with long grasping forceps. The owner was present at this time and discussion centered on splenectomy in the hope that it would, at least partially, relieve the progressive anemia. Since basal anesthesia had been accomplished, we decided to proceed, rather than wait any longer and 2% procaine with epinephrine was injected locally along the mid-line. An endotracheal tube, with inflation cuff, was inserted into the trachea. A combination of nitrous oxide and oxygen, using a positive pressure apparatus, completed our anesthesia.

There was no evidence of inflammatory changes within the peritoneal cavity with the exception of the spleen which was greatly enlarged; weighing 16.5 ounces. The splenic vessels were ligated and the spleen removed. The peritoneum and two layers of fascia were closed with independent continuous rows of size O hard chromic catgut. The skin was closed with nylon sutures. 150,000 units of penicillin were administered immediately after surgery. This was continued for three days. The temperature receded from 104.4°F. preoperatively to 102.4°F. on the 18th.

On the 17th, the hemoglobin was 5.49 grams. On the 18th, 200cc of blood was transfused. On this date, the patient was discharged at the owner's request, with instructions for continuing the iron, folic acid and vitamin medication at home. The general appearance of the animal was good at this time and its appetite was entirely normal. It was returned March 22nd with a hemoglobin of 1.83 grams. Transfusion of 200cc of blood were given and 200cc more on the following day.

March 24th, eight days after splenectomy, the skin sutures were removed from the apparently well-healed scar. At this time the temperature was normal, the appetite good, and the mucous membranes still pale. The animal was quite active and took a short walk with her owner. She was replaced in her kennel and within 30 minutes eviscerated herself. The viscera was prolapsed almost in its entirety, including the stomach. The endotracheal tube was again passed, nitrous oxide and oxygen were again administered. The intestines were covered with sterile towels, soaked in warm sterile physiological saline with aqueous penicillin. The stomach was greatly distended and impossible to replace. An incision was made into the stomach wall and a cupful of grass, apparently picked up on its morning stroll, was removed. The in-

cision in the stomach wall was closed with a double row of Lembert sutures, using 00 silk. The viscera was cleansed as well as possible with warm saline-penicillin and then replaced. The various layers of the abdominal wall were carefully separated and sutured with 00 silk. The skin was again sutured with nylon sutures. A compression band of rolled sterile towels and elastoplast bandage was applied entirely around the animal, from the xyphoid cartiledge to the pubis and allowed to remain. Penicillin, 300,000 units, were again administered and continued daily. Immediately post-operatively the animal was placed in an oxygen tent and removed 12 hours later. There was a temperature elevation of 103.8° F. On the 25th, 175cc of blood was transfused. The temperature was normal on the 26th and 27th. On the latter date a blood count revealed:

RBC	2,740,000
WBC	12,000
HGB	5.92 gms.
CI	.77
Piroplasmosis, negative	
Differential:	
Seg.	35%
Stab.	30%
JU	1%
Lymph	31%
EO	2%
BA	1%
Anisocytosis, microcytosis. Schilling index—approx. 31/35 Sed. rate Cutler (not corrected) 30mm in one hour.	

On the 28th, the hemoglobin was 2.11gm and 175cc of blood was transfused. There was a slight temperature elevation two days prior to death. The animal succumbed in the late afternoon of the following day, 24 days after admission and five days after evisceration. Mild icterus appeared approximately three hours before death.

A bone marrow specimen obtained immediately post mortem revealed upon microscopic examination almost complete aplasia with suppression of all cellular elements.

At autopsy, 10cc of blood were collected from the heart, filtered through a Berkefeld filter and inoculated into two test animals. One was a mixed breed puppy, eight-weeks of age and the other a three-year-old Chow. Neither animal showed any symptoms 45 days after inoculation and slides made of the peripheral circulation every other day, starting two days after inoculation and continued daily for three weeks after inoculation, showed no inclusion bodies.

Autopsy Report

Subject:—
Black female Scottie, approximately 7 months of age.

General Appearance:—
Good. Weight approximately correct. Moderate icterus of visible mucous-membranes.

Lungs & Bronchi:—
Normal.

Heart:—
Thrombosis in right ventricle and in both pulmonary arteries.

Abdominal Cavity:—
Normal. Well healed ventral incision following laparotomy.

Stomach:—
Normal. Well healed scar following gastrotomy.

Intestines:—
Normal.

Liver:—
Normal.

Kidneys:—
Normal.

Cause of Death:—
Cardiac thrombosis.

Comment:—
The blood appearing in both the abdomen and thoracic cavity was, of course, quite thin and was most noticeable for the small quantity. No clots were present aside from those mentioned in the arteries.

Discussion

There were several aspects of this case which, to us, were extremely interesting. (1) The insidious development of an extreme anemia in the complete absence of parasitism, (2) the various unrelated factors which tended to cloud the issue, *i.e.* the pin in rectum, the necessity for gastrotomy, and (3) the fact that 1500cc of blood (nearly three times the total normal blood volume) were transfused within a matter of 23 days with no appreciable prolonged elevation of the red count or the hemoglobin, despite the fact that there was no obvious blood destruction. The blood was cross-matched with patient's blood before it was transfused; the patient showed no hematuria or hemoglobinuria; there was no gross bleeding from the intestinal tract and what icterus appeared, was in a very mild form and developed only three hours before death. The patient showed no transfusion reaction of any kind following any of the transfusions. If ever it can be truthfully said that a patient lived on "borrowed blood", this one did.

We searched carefully in the environment of this animal for any chemical agents which might have produced the aplasia encountered, but we could find no trace of any such exposure, either temporary or prolonged.

In view of the clinical and laboratory record contained herein, it is our conclusion that

this animal suffered from primary idiopathic aplastic anemia.

Summary

A clinical report is presented in which a Scotch Terrier puppy insidiously developed a severe anemia, was transfused with nearly three times its normal blood volume in a matter of 23 days; showed no appreciable elevation in blood picture; underwent a splenectomy with no alleviation of the anemia; suffered an evisceration and finally succumbed to the original anemia. The anemia is classified as primary idiopathic aplastic anemia.

Substitution of Humans for Experimental Animals

From time to time reference has been made in these pages to Congressman Wm. Lempke of North Dakota and his bill to prohibit the use of dogs in scientific research in the District of Columbia.

Judging from Representative Lempke's speeches and interviews in support of his bill, it is aimed primarily at the research conducted by the Medical Department of the Army and the U. S. Public Health Service. However, the bill if enacted would affect all biological research in the Federal District and, because the B.A.I. laboratories are in Washington, it would probably hamper research at the research center at Beltsville, Maryland.

For a better understanding of the objective of Lempke and his supporters it should be explained that, while the measure now being urged upon Congress for adoption would prohibit only the use of dogs in animal experimentation, there is no pretense that this comprises the whole aim of the antivisectionists. The dog is specified only as an entering wedge, in a drive to prohibit all animal experimentation, because of the ease with which sentiment can be generated for this much loved animal.

In the past it has been difficult to harmonize many of Lempke's preposterous statements with a concept that he is informed and sincere or in fact that he is either. But in a CBS radio broadcast April 5, 1948, in support of what he terms his antivivisection bill, he supplanted some doubts as to his sincerity with questions as to his sanity. Along with his usual unsupported statements that nothing worthwhile has ever been discovered by use of dogs for experimentation and no medical progress has ever resulted from experimentation with this animal that could not have been achieved more easily and more quickly by clinical observation, he made the statement that, "hundreds of persons, because of poverty, cannot get the benefits of surgery and medical attendance. If our surgeons and physicians would operate on these they would learn more than by torturing healthy dogs and other household pets. These unfortunate human sufferers would be glad to have surgeons perform (experimental) operations before classes of real medical students." He went on to call for "actual demonstrations on human beings", instead of on dogs. He did not specifically state that the toxicity of new drugs should be determined by testing them on "unfortunate human sufferers" or that medical students should be taught the technic of, *e.g.* intestinal resection and anastomosis or brain surgery by operating on these same unfortunates, but he implied just that.

The advocacy of substituting *Homo sapiens* for four-footed animals in biologic research seems fantastic even for an antivivisectionist to advocate. But it may be well to get used to the idea. Should the measures constantly urged upon state legislatures by antivivisectionists become law, that is exactly what would happen. In the future students wouldn't have many new agents or new technics or new operations to study, but a new generation of surgeons would perform delicate operations about as they are now performed *after* they had learned the technic on human patients.

Antivivisectionists always hold out the inference, but seldom specifically state, that all animal experimentation is painful, cruel, brutal, etc. Lempke asserted all experiments not under anesthetics are in this category and all in which the anesthetized animal is allowed to recover are painful, inhumane, cruel, bestial, etc. He offered no excuse for not stopping such experimentation by prosecution under the humane laws now on the statute books. Animal experimentation is subject to the same anticruelty laws as are operations performed in the routine of veterinary practice. That they oppose the one and favor the other, must again raise a question as to whether preventing suffering in animals is an objective of antivivisectionists or whether biological research is their target.

The Use of Sulfaquinoxaline in the Control of Liver Coccidiosis in Domestic Rabbits*

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Introduction

In recent years, the therapeutic value of the various sulfonamides has been the subject of much research. There are so many derivatives of these compounds and they vary so much in their therapeutic and toxic properties, that to review the literature would be nearly impossible. To review the therapeutic uses of the sulfonamides with relation to coccidiosis alone requires considerable time. Therefore, in this paper only the literature pertaining to sulfaquinoxaline and to the species of coccidia commonly found in the domestic rabbits will be reviewed.

During the past 18 months, a study has been made at this station of the five species (individually and as a group) of coccidia commonly seen in domestic rabbits[1]. The basis of these studies was immunity to coccidiosis. It was realized that, if any therapeutic studies were to be undertaken, the possibility of immunity resulting from previous infection must be taken into consideration. In other words, no conclusive results can be drawn unless the experimental animals are raised free from the species of coccidia to be studied. It is extremely difficult to raise rabbits entirely free from coccidia. At best, only the number of species present in the rabbitry at any given time can be limited. Since immunity to coccidiosis in rabbits is strictly species specific[1], it is not entirely necessary to have the rabbits free from coccidia, except for the species to be investigated.

The use of the sulfonamides in the treatment and control of coccidiosis has received considerable attention during the past few years. Many of the commercial feed companies and drug houses in promoting their products have made extensive field trials. The results of these trials have been quite variable and our own studies in the laboratory have brought out some marked limitations of the use of sulfonamides[2]. While many drugs have considerable value in the laboratory or under close medical supervision, they are frequently misused when placed in the hands of the general public. Improper diagnosis of a disease is perhaps the most common reason for the failure of any drug or treatment; therefore the first important step is to know exactly the disease or parasite that is to be studied.

For a drug to be safe to dispense, either for direct medication or to be included in the feed or drinking-water, several factors must be considered:

1. The drug must have the desired therapeutic value.
2. There must be a reasonable margin of safety for the patient.
3. It must be easy to administer.
4. If it is to be mixed in the feed or water, it must be compatible and stable.
5. Its use must be economically sound.

Since the majority of the sulfonamides are relatively toxic and have definite contraindications, these properties usually vary with the species of the animal to be treated. Other factors that must be considered within the species are age and weight of the animal, and the nature of the disease or persisting pathologic effects of previous disease.

Inasmuch as investigation of rabbit coccidiosis has been underway at this station, it was considered advisable to extend the studies to include therapeutics. Several preliminary trials were conducted in which a variety of drugs were used; the majority of them being eliminated as either being useless or having definite limitations.[2] While these studies were in progress, one of the newer drugs, sulfaquinoxaline (Merck), was brought to our attention, and a supply obtained for experimental use.

Materials and Methods

As stated in the introduction, this report concerns studies of sulfaquinoxaline, 2-sulfanilyl aminoquinoxaline. Its activity is similar to other complex sulfonamides, but it has an advantage over some other sulfonamides in that it persists in the blood stream for one to four days following a single oral administration[4, 5]. It also has two toxic properties that may place serious limitations on its general use [5, 6]. The first of these is that in dogs, mice, and rats hypoprothrombinemia

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(a deficiency of prothrombin in the blood; vitamin K deficiency) may be produced within 24 hours following a single administration[6]. This may be prevented or corrected by vitamin K_1, but not by menadione, which is the synthetic 2-methyl-1, 4-naphthoquinone[6]. Secondly, kidney damage was produced in rats and monkeys when the plasma concentration was 10 mg % or higher[6]. This damage cannot be prevented by the use of bicarbonate of soda or alleviated by the use of fluids[6]. Kidney damage has not been observed in the rabbit[6].

Delaplane[7] *et al.* reported favorable results from the use of sulfaquinoxaline in the control of cecal coccidiosis in chickens. These researchers also observed, that giving the host sulfaquinoxaline did not interfere with its development of immunity against the parasite. This is an indication that the host resistance may be developed during the first generation of schizogony.

The rabbits used in these trials, which included investigation into parasitic control, immunity, and toxicity, were raised in our small-animal room. The breeding stock consisted of standard New Zealand white rabbits, a strain of which we have used at the laboratory for some time. The basic feed consisted of commercial, rabbit, green pellets and from time to time, some green feed and carrots. The young rabbits were checked for parasites at weaning time and again before being put on trials. When spontaneous infection occurred in some of the litters, the oocycts were sporulated, so that positive identification could be made. At no time during the entire trials, was *Eimeria stiedae* found in the isolation room. The majority of the rabbits were 10 to 12 weeks of age before being used. The trials were conducted in another building, so that the isolation room was not contaminated.

The coccidia used in these trials were washed from the ground livers of field cases of infection. The oocysts were covered with 2% potassium dichromate and allowed to sporulate at room temperature. When sporulation was apparently complete, the oocysts were stored in the refrigerator until needed.

When the size of the dosage was decided upon, a sample of the oocysts in suspension was drawn off with a 0.1 pipette and dilution counts were made. Counts were made also to determine the percentage of sporulated oocysts and the total corrected to include only sporulated oocysts.

Trial One

Trial one was exploratory in nature. As there were no available data on the use of sulfaquinoxaline in the control of coccidiosis in domestic rabbits, it was necessary to use information developed from other animals. As suggested by Dr. D. F. Green[8], the sodium salt was prepared and used in a 0.05% solution in the drinking-water. It is desirable to use medicated drinking-water because, early in the disease, the rabbits eat less feed and drink more water. *Eimeria stiedae* was selected as the parasite for study, because we had rabbits free from this organism and the lesions could be studied macroscopically.

Six rabbits from two litters were weighed, tattooed, and divided into two pens. The blood-clotting time of each rabbit was determined, using the capillary tube method. The blood-clotting time was also determined on the tenth day of the trial, and at the end. These data are given in Table I.

Rabbits in pen one were given the standard, green, pellet ration and drinking-water containing 0.05% sulfaquinoxaline. Those in pen two received the same ration, but no drug was added to the drinking-water. A weekly feeding of green feed was given to the animals in both pens. Two days following this grouping, each rabbit received a dosage of 50,000 sporulated oocysts. These were deposited directly into the stomach, by using a rubber tube attached to a glass syringe.

The rabbits were examined daily throughout the trial. On the 14th day, one rabbit from each pen was autopsied and the livers examined, in order to be sure that no spontaneous infection had occurred. On the 18th day, all rabbits were autopsied; the data of trial one is recorded in tables I and II.

Trial Two

Trial two was conducted in a manner similar to trial one. Due to the marked contrast between the two groups of rabbits in trial one, it was felt that some error may have occurred. Thus, this trial was to check our methods rather than to seek new data. In this trial four rabbits were used. The two in pen one received the sulfaquinoxaline in the drinking water and those in pen two were used as controls. The dosage of oocysts was

reduced to 10,000 in this trial. Blood clotting times were also recorded.

The results of this trial are recorded in tables I and II.

Trial Three

It was suggested in the report by Delaplane[7] *et al.* that in chickens treated with sulfaquinoxaline following inoculation with *Eimeria tenella*, immunity was developed although the pathological aspects of the disease were not manifest.

In order to determine whether this phenomenon was evident in rabbits inoculated with *Eimeria stiedae*, trial three was conducted.

Nine rabbits were selected, weighed, tattooed and divided into three pens. Three rabbits were put in pen one and given the standard ration and 0.05% sulfaquinoxaline in water. Two rabbits were placed in pen two and served as controls, not receiving any of the drug. The four rabbits in pen three received the same ration and drug as pen one. All of the rabbits in pens one and two and two of the rabbits in pen three received 100,000 oocysts. Two of the rabbits in pen three received no oocysts but received the drug throughout the normal endogenous cycle of the parasite.

This trial was initiated October 2. October 21, one rabbit from each of the three pens, including one of the inoculated rabbits[2, 3] from pen three was autopsied. Only the rabbit in pen two (control pen) had any lesions of liver coccidiosis. Blood clotting time and

TABLE I.—Blood Clotting Time in Rabbits as Effected by Sulfaquinoxaline.)

Trial One

Rabbit number	Pen number	Blood clotting time in seconds				
		20 July	30 July	4 August	10 August	
371	1	260	280		290	+ 30
372	1	280	270	330		+ 50
373	1	300	300		330	+ 30
374	2	270	260	280		+ 10
375	2	310	270		260	- 50
376	2	250	250		260	+ 10

Trial Two

Rabbit number	Pen number	Blood clotting time in seconds			
		13 August	23 August	2 September	
384	1	270	270	260	- 10
385	1	250	280	290	+ 40
386	2	280	300	290	+ 10
387	2	260	260	240	- 20

TABLE II.—Showing the Effect of Coccidiosis on the Weight of Treated (Pen 1) and Untreated (Pen 2) Rabbits

Trial One

Rabbit number	Pen number	Initial weight in grams	Live weight at autopsy		Dressed weight	Weight of Liver
371	1	2098	2807		1531	105
372	1	1965	2438	4 August	1304	80
373	1	1673	2608		1191	70
374	2	2343	2683	4 August	1276	95
375	2	2013	2665		1276	215
376	2	2070	2660		1162	190

Trial Two

Rabbit number	Pen number	Initial weight in grams	Live weight at autopsy	Dressed weight	Weight of Liver
384	1	2381	2636	1381	90
385	1	2835	3374	1814	105
386	2	2636	2305	1559	135
387	2	2551	2835	1476	115

weights other than liver weights were not recorded in this trial. The drug was withdrawn from all rabbits October 21.

rabbits from pen three. Only the rabbit remaining rabbits were given a challenge dose of 50,000 sporulated oocysts, The rabbit in control pen two was passing large numbers of oocysts. It was evident, therefore, that infection was present. This rabbit was in poor condition, pot bellied and a greatly enlarged liver could be felt upon palpation.

oxaline in the body of the host rather than to acquired immunity.

Trial Four

This trial was conducted in order to determine whether the resistance to coccidiosis following prolonged administration of sulfaquinoxaline was due to the residual drug in the body of the host or to immunity developed during the first generation of schizogenisis.

Nine rabbits from two litters were selected,

TABLE III.—(Trial 3) Showing the Protection from Coccidiosis due to the residual Effect of Sulfaquinoxaline

Rabbit number	Pen no.	Drinking water	Initial dose of oocysts 2 October	Observations 21 October	Challenge dose of oocysts 28 October	Observations 15 November
1-1	1	0.05% Sulfaquinoxaline*	100,000	Liver normal	------	--------
1-2	1	"	100,000	No oocysts in feces	50,000	Normal liver
1-3	1	"	100,000	"	50,000	No oocysts in feces
1-4	2	Tap water	100,000	Infected liver	------	--------
1-5	2	"	100,000	Oocysts in feces	none	Infected liver
0-0	3	Sulfaquinoxaline	none	No oocysts in feces	50,000	Normal liver
2-2	3		100,000	"	50,000	No oocysts in feces
2-3	3		100,000	Normal liver	------	--------
2-4	3		none	No oocysts in feces	50,000	No oocysts in feces

* The sulfaquinoxaline was removed from the drinking water in pens one and two on the 21st of October.

November 15 four rabbits were autopsied, one each from pens one and two and two in pen two, the control pen, showed any lesions.

Rabbits 0-0 and 2-4 in pen three had not received the initial dose of oocysts on October 2 and the feces were negative when checked for parasites on October 21. From these observations it was clear that the rabbits could not have developed any natural acquired immunity. Since these rabbits failed to develop coccidiosis following the challenge dose on October 28, it appeared that this was due to the residual sulfaquin-

tattooed and divided into three pens. All rabbits were fed the standard ration. Those in pens one and two were given sulfaquinoxaline in the drinking water. The rabbits in pen three were used as the controls; receiving only tap water. At the end of the first 20 days of this trial, tap water was substituted for the sulfaquinoxaline in the water in pen two. The rabbits in pen one received the drug throughout the trial.

The doses and the date of administration of the sporulated oocysts, as well as the results of the autopsies and fecal examinations, are recorded in Table IV. Blood co-

TABLE IV.—(Trial 4) Showing Susceptibility to Coccidiosis 14 and 48 Days after Administration of Sulfaquinoxaline was Discontinued.

Rabbit number	Pen no.	Drinking water	November 5 sporulated oocysts	November 25 autopsy results	December 9 sporulated oocysts	December 29 autopsy results	January 12 sporulated oocysts	January 22
5-1	1	0.05 sulfaquinoxaline	50,000	liver normal	--------	-------	-------	----------
5-2	1	in water	50,000	oocysts in feces	50,000	liver normal	-------	----------
5-3	1		50,000	" " "	50,000	no oocysts in feces	50,000	liver normal
5-4	2	0.05% sulfaquinoxaline	none	liver normal	--------	-------	-------	----------
6-1	2	from Nov. 5 until	none	no oocysts in feces	50,000	a few lesions	-------	----------
6-2	2	Nov. 25. Tap water from Nov. 26 until end of trial	none	" " " "	none	no oocysts in feces	50,000	liver infected
6-3	3	tap water	none	liver normal	--------	-------	-------	----------
6-4	3		none	no oocysts in feces	50,000	liver infected	-------	----------
6-5	3		none	" " " "	none	no oocysts in feces	50,000	liver infected (Severe)

agulation tests were not made on these rabbits. They were weighed weekly, but, inasmuch as the individual rabbits made satisfactory weight gains the weights were not recorded.

Discussion

The results of these trials showed that liver coccidiosis could be controlled by the use of sulfaquinoxaline. The four trials as they were conducted were largely repetitive and were directed more toward checking for possible errors in previous trials, than to developing new data. Trial one was purely exploratory and the results were so positive that it was deemed necessary to repeat it in order to check the possibility of an error in inoculation. Trial two confirmed the observations made in trial one.

As previously mentioned sulfaquinoxaline developed hypoprothrombinemia when given to dogs, rats and mice[6]. Blood coagulation time was determined on the rabbits used in trials one and two. While there was a slight increase in the blood coagulation time in the rabbits that received sulfaquinoxaline compared to the controls, it was not significant, nor was there any evidence of hemorrhage in the carcasses at the time of autopsy. The blood clotting times are recorded in seconds in Table I.

Histological sections were not made of the kidneys, but all were studied grossly upon autopsy. There was no evidence of renal damage in any of the rabbits examined. In fact, the rabbits receiving the drug were equal to the controls in weight, vigor and general appearance.

Since Delaplane[7] *et al.* found that chickens inoculated with *Eimeria tenella* and given sulfaquinoxaline develop immunity to subsequent infection it was decided to explore this possibility in liver coccidiosis in rabbits. In previous studies[1] it had been determined that the degree of immunity is in direct proportion to the size of the previous inoculation with sporulated oocysts. Inasmuch as the treated rabbits developed no lesions or mature oocysts, their immunity was questioned.

The observation made during trial three indicated that there might be a prolonged retention of the drug by the host following continuous dosages of 20 days or more. The fact that two of the rabbits, which had not been exposed to the disease previously but had received sulfaquinoxaline, failed to develop the disease when exposed indicated that the resistance was due to the residual effect of the drug and not to immunity. Rabbits that were inoculated 14 and 48 days following their removal from the drug did develop lesions of coccidiosis. In those rabbits inoculated on the 14th day there were very few lesions but in the later group the infection was more severe.

Throughout this study, the number of rabbits available was limited. Thus the results should not be considered conclusive. Until further studies can be made on a larger scale and the drug tested under field conditions it is reasonable to assume that neither the full possibilities nor limitations of sulfaquinoxaline in the treatment of liver coccidiosis are known. At the present time this product offers more promise, in the field of rabbit therapy, than any of the other drugs yet explored. It is also possible, as further studies are made, that the amount of sulfaquinoxaline can be reduced and the method of giving it can be improved.

Summary

1. Liver coccidiosis of rabbits can be effectively controlled with sulfaquinoxaline.

2. In this study no toxic effects of sulfaquinoxaline were noticed in any of the rabbits under observation.

3. Sulfaquinoxaline did not produce hypoprothrombinemia or kidney damage in rabbits based on blood clotting time or gross observation.

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Glycerite of Hydrogen Peroxide in Surface Infections in Animals
(A Clinical Evaluation)

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THE control of purulent infections of the skin and mucous membranes has been one of the most serious problems confronting the veterinarian. We have long searched for a bactericidal agent for topical application which is potent yet does not cause harmful effects when applied repeatedly or when swallowed. The appearance of reports on two new medications in the recent medical and surgical literature[1,2,3] aroused our interest. These communciations indicated that glycerite of hydrogen peroxide, 2.5%, and glycerite of hydrogen peroxide, 1.5% with carbamide* are bactericidal and bacteriotoxic for gram-positive and gram-negative bacteria,[4,5] as well as for aerobic, anaerobic and spore forming organisms. Patch tests on many hundreds of humans and repeated application during the course of treatment demonstrated absence of toxicity and irritating effect.[3] It is noteworthy that the clinical tests for toxicity of these new solutions were first made with humans and that our clinical work on animals was done subsequently; thus reversing the usual procedure.

Preliminary control tests were carried out on cases routinely treated at our hospital. This early work was so strikingly successful that these medicaments have been adopted for the treatment of all surface infections at our hospital†. The total number of patients treated in our clinic and hospital with these agents exceeds 1,000. Because of the large number, the individual case histories would prove tedious. Instead, the conditions amenable to classification are grouped. The types of conditions treated and the results are briefly summarized in the following:

Otitis externa.—155 cases (feline and canine): These included mixed bacterial, fungous, eczematous, cankerous, and catarrhal conditions. The patients' ears were cleansed with a dry, cotton swab, once daily, and one-half dropperful (0.5cc) of glycerite of hydrogen peroxide, 1.5% with carbamide, was instilled twice daily. Remissions occurred in a majority of these cases in 1 to 5 days.

Abscesses.—69 cases (feline and canine): The majority of these conditions were caused by the bites of other animals. Glycerite of hydrogen peroxide, 2.5%, was instilled by syringe following surgical intervention. Decongestion and reduction of swelling occurred within a few hours. The time required for both healing and hospitalization were markedly decreased compared with the period required with other methods of therapy.

Ranula.—49 cases (canine): Treatment consisted of a five-minute irrigation with glycerite of hydrogen peroxide, 2.5%, twice daily following surgical intervention. Rapid recovery occurred in all cases. There were no complications or untoward sequelae.

Abrasions, lacerations, denuded areas and *fractures.*—115 cases (feline and canine): In this group there were approximately 50 cases of epiphyseal and symphyseal fractures, some so severe that bone, tendons, and ligaments were exposed. These cases were treated by topical applications of glycerite of hydrogen peroxide, 2.5%, applied with a brush to the exposed areas twice daily. The necrotic material was promptly peptized and was soon replaced by healthy granulation tissue. Healing was hastened. The use of glycerite of hydrogen peroxide, 2.5%, because of its non-toxic and non-sensitizing qualities, permits the making of repeated applications, enabling one to salvage animals which previously would have been abandoned.

Pustular dermatitis.—28 cases (canine): The treatment consisted of swabbing the infected areas with a brush saturated with glycerite of hydrogen peroxide, 2.5%, three times daily. Rapid recovery occurs in suitable cases.

Preputial inflammation.—42 cases (canine): Glycerite of hydrogen peroxide, 2.5%, diluted to 50% with water, was instilled into the infected area. One application eliminated infection.

*A product of the International Pharmaceutical Corporation, 132 Newbury Street, Boston, Massachusetts, by whom the materials for this study were supplied.
†The Emmerson Animal Hospital, Quincy, Mass.

Hock and *Pubic infections.*—12 cases (canine): Treatment with glycerite of hydrogen peroxide, 2.5%, three times daily demonstrated the prompt response which routinely follows the use of this medicament.

Burns.—Clinical routine cases (feline and canine): Burns of large areas responded remarkably well upon treatment with glycerite of hydrogen peroxide, 2.5%. We deem it worthy to report two particular cases of cats, which had fallen into cooking oil at a temperature exceeding 250°F. More than one-half of the hind leg of each cat had suffered third degree burns. In both cases the area described was entirely denuded of skin and hair. Recovery was complete. There was a surprisingly small amount of scar tissue following the treatment. This type of injury usually results fatally.

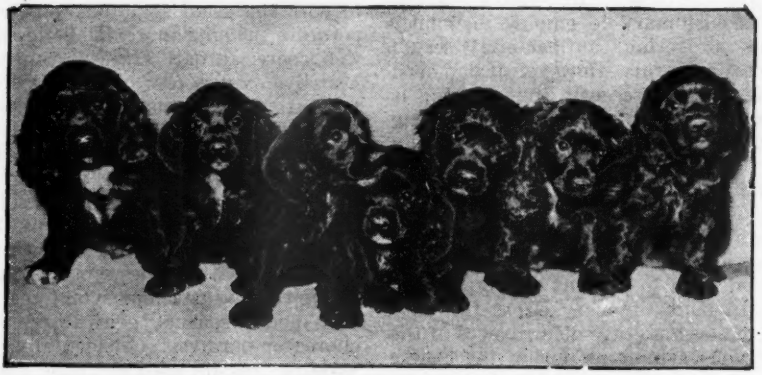
Pyorrhea.—90 cases (canine): The tartar was removed in the usual manner. A wooden match and saturated swab of glycerite of hydrogen peroxide, 2.5%, was used three times daily. This resulted in decongestion of the gums and cessation of the inflammation. Immediate improvement in the soft, spongy areas was observable. Normal healthy gums were observed within three days after the first treatment.

Stomatitis.—35 cases, all types (feline): Twenty-eight of these cases involved sloughing of the tongue. Treatment consisted of swabbing the tongue and mouth with glycerite of hydrogen peroxide, 2.5%, diluted with two parts of water. The necrotic tissue and detritus rapidly disappeared. Infection was eliminated and the patients responded with immediate restoration of appetite

Alveolar Osteitis.—13 cases (canine): 12 cases (feline): A gauze plug, saturated with gylcerite of hydrogen peroxide, 2.5%, was inserted into the socket and renewed daily. Congestion and infection were eliminated and the patients were discharged in three to five days.

Summary

In all, over 1,000 cases of external infections and traumatisms have been treated successfully with glycerite of hydrogen peroxide, using either the 2.5% solution without carbamide, or the 1.5% solution with carbamide. Of these, 620 amenable to classification are described. To these must be added several hundred cases of animals seen routinely at the clinic, suffering from burns and other conditions not classifiable because of the minor nature of the injury or complex syndromes which would require too great and too detailed description. In no cases was irritation or toxicity noted.



Dogs as well as cats responded satisfactorily to the medication.

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Prevention of Meningitis in Dogs

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THE use of anti-distemper vaccine once the clinical disease has developed and the dog shows symptoms of distemper has been contrary to the generally accepted methods of treating this complicated disease which is fatal in a large percentage of cases. Popular opinion among veterinarians has been that distemper vaccine is valueless, once symptoms have developed. That was also my opinion up to three years ago.

Once symptoms of acute infection are manifested, it is customary to employ distemper homologous antiserum, antibacterial serum and/or mixed bacterins. However, it had been my experience until recently that nothing is dependable in preventing meningitis during the course of distemper. Serum occasionally prevents meningitis, the nightmare of small animal practice, but not often. The sulfa drugs have been used in large and small doses with too frequent failures. Penicillin and streptomycin have also failed. Mixed bacterins cannot be relied upon to prevent this fatal complication. In spite of every effort the dogs continued to develop grave disturbances of the central nervous symptoms during the course of conscientious treatment and had to be destroyed, died, or were taken to another hospital to die. I have seen dogs with generalized chorea respond to large intravenous doses of thiamin (100mg) and sulfonamides, but not many. Just as many recovered without thiamin and sulfa drugs. A few responded to the long continued use of barbiturates, morphine and diphenylhydantoin sodium (incidentally, the latter works very well in epilepsy—chronic convulsions—in dogs, but must be given daily during the remainder of the animal's life). I have seen some respond to large doses of serum, but not many. A few recovered with no treatment, but not many.

It is believed by some that the neurotropic strain of the virus and not secondary invaders is the true causative agent of specific meningitis in dogs. Pathologists have found inclusion bodies within the parenchymatous cells of the central nervous system, pointing to a viral infection, instead of a bacterial infection. Clinical observation with various therapeutic agents has led me to support this view. Excellent results with specific vaccine has left no other alternative and I wish to submit the results that others also may benefit. The explanation of why serum does not act where vaccine does is beyond the scope of a practitioner. That is a task for pathologists. All I know is that vaccine works; serum fails. It is true that distemper is not the only disease associated with meningitis, but it is a known fact that it is by far the most frequent disease (probably in over 95% of cases) associated with clinical cases of meningitis, as seen in small animal hospitals. Discouraged with treatment many veterinarians suggest euthanasia for their patients as an escape. No small wonder. Here is the picture: A dog is brought in with the usual symptoms of elevated temperature, cough, anorexia, listlessness, vomition, sore throat, corneal congestion, etc. Usually, only a few of these symptoms are present. The animal receives one or more large doses of distemper homologous antiserum, antibacterial serum or mixed bacterins. It probably receives in addition penicillin, streptomycin and/or one of the sulfonamides. Vitamins and tonics are added by the younger veterinarians. Then comes the sad news. After a few weeks, maybe sooner, maybe later, *bang!* the dog develops symptoms of meningitis, mouth spasms, generalized convulsions, chorea or paralysis. (Incidentally, I have had excellent results with epidemic paraplegia by giving eight daily doses of thiamin, 100mg each, intravenously.) Further treatment (extremely disappointing) consists of more serum, more vitamins, a different sulfonamide, increased sedatives, arsenicals, from penicillin to streptomycin and vice versa. The owner then becomes suspicious and discouraged; the veterinarian is disgusted with small animal practice and tells the kennel man to carry on while he hies him to the golf course and finds the golf ball an excellent object for punishment. All the while thinking, "If only there were some way to prevent that blankety disease!" That had been an obsession with me during the past, after too frequent unpleasant experiences. At least, when the owner brings in a dog with symptoms of meningitis already present, the veterinarian can save face by giving a very grave prognosis. But when a sick animal is brought in with what the owner describes as "merely a cold," how can we predict, which one will and which will not develop meningitis? The only real solution then would be to find some specific agent that could prevent the development of meningitis: first recognized by acute convulsions, mouth spasms, or acute hysteria (chronic hysteria and chronic convulsions are not fatal, and not associated with distemper), and later on by local or generalized chorea, general paralysis, or convulsive coma. Remember that paraplegia does not follow hysteria and con-

TABLE I—Typical Controls.—Dogs Treated without Vaccine and not Showing Nervous Symptoms

BREED	AGE (months)	MAIN SYMPTOMS	TEMP. °F.	TREATMENT	RESULTS
Black & Tan)	same 36	Nasal catarrh, dyspnea	102.8	MB-SD vitamin B complex morphine	Generalized chorea in 15 days
Black & Tan)	owner 36	Bronchitis, anorexia	104	MB-SD-penicillin	Well
Boston Terrier	24	Tonsilitis, pharyngitis	103.8	SD-AS	Died in convulsive coma in 10 days
Hound	2½	Diarrhea, listless, (neg. for coccidia)	101.8	Bismuth, pheonbarbital SG-penicillin	Died in convulsions in 18 days
Irish Setter	3	Pharyngitis, enteritis (neg. for coccidia)	103	DS-bismuth, SN-morphine	Generalized chorea in 30 days. Destroyed
Spitz	12	Congested cornea	105	Thiamin, DS-MB-SN Streptomycin (oil & wax)	Well
Pekingese)	same 18	Congested cornea, anorexia	105.2	T-sodium cacodylate MB	Well
Pekingese)	owner 9	Anorexia, listless, diarrhea	103.7	DS-Thiamin-MB-bismuth nembutal	Died in convulsive coma in 3 weeks
Collie	11	Tonsillitis, nasal catarrh	103.2	DS-SN	Well
Spitz Cross	4	Anorexia, listless, enteritis	103.8	DS-Bismuth-STH-T	Chorea in 12 days
Spitz	2½	Diarrhea, anorexia (neg. for coccidia)	102.5	DS-ST	Chorea in 28 days
Boston Terrier	4	Diarrhea	104	DS-morphine	Generalized chorea Destroyed in 12 days
Cocker	18	Dyspnea, rales	102.8	SM-diathermy-penicillin	Well
Samoyede	5 yrs	Anorexia, pharyngitis	105.2	Streptomycin in oil & wax	Died conv. 12 days
Pointer	6 yrs	Dyspnea, rales	104	SM-diathermy-penicillin	Convl. in 18 days
Beagle	24	Tonsillitis, cough	103	SN-codeine	Well
Cocker	36	Listless, anorexia, nasal catarrh	104	MB-DS-penicillin	Chorea in 13 days
Cocker	6	Cough, corneal congestion	103.5	SD-dilaudid	Well
Scotty	9	Cough, listless, anorexia	102	SP-dilaudid	Well
German Shepherd	8	Listless, tonsillitis	102.2	SP-MB	Convl. in 14 days

TABLE II—Typical Meningitis Cases Receiving the usual Treatments

BREED	AGE (months)	MAIN SYMPTOMS	TREATMENT	RESULTS
Collie	3	Chorea (local)	DS-T-MB-SN	Generalized Chorea. Died in 10 days
Collie	5	Chorea (local)	DS-SD-T-MB	Generalized Chorea. Died in 5 weeks
Cocker mixed	8	Chorea (local)	MB-T-SN-ascorbic acid Morphine	Generalized Chorea. Destroyed in 8 days
Cocker	4	Chorea (local)	T for 3 weeks	Destroyed in 3 weeks
Scotty mixed	12	Chorea (general)	SD-diphenyl hydantoin sod.	Convulsions in 3 days
Fox Terrier mixed	6	Chorea (general)	DV-T phenobarbital	Convulsions in 10 days
Cocker	4	Chorea (general)	SN-penicillin-morphine	General paralysis. Destroyed in 1 week
Spitz mixed	3½	Convulsions	Nembutal (½gr per 5 lb)	Died next day
Collie	9	Convulsions	SD-T-MB-Morphine	Chorea. Died in 2 weeks
Cocker	6	Convulsions	SP-MB-Morphine	More convulsions in 13 days
Fox Terrier	36	Convulsions	Nembutal-phenobarbital Vitamin B Complex	Chorea & general paralysis 1 month later.
Fox Terrier	12	Hysteria & Convulsions	Ascitic fluid-phenobarbital	General paralysis. Destroyed in 5 days.
Dachshund	7	Convulsions	SM-diphenyl hydantoin sod.	Chorea. Died in 3 days.
English Setter	10	Convulsions	DV-SM-phenobarbital	Died in convulsive coma in 19 days.
English Setter	5 yrs.	General paralysis Dyspnea	Tryparsamide, penicillin Vitamin B complex	Chorea in 3 weeks
Scotty	9	Hysteria & Convulsions	Streptomycin in aqueous sol.	Died in convulsions in 4 days.
Beagle	10	Convulsions	DS-nembutal	Well
German Shepherd	11	Paraplegia	T for 8 days (100mg)	Well
Beagle	24	Paraplegia	T for 8 days	Well
Cocker	4 yrs.	Paraplegia	T for 8 days	Slight improvement

SN—Sulfanilamide
ST—Sulfathiazole
SD—Sulfadiazine
SP—Sulfapyridine
STH—Sulfathalidine
T—Thiamin
DV—Distemper vaccine
IV—Intravenously
SG—Sulfaguanidine
SM—Sulfamerazine
MB—Mixed bacterin
DS—Distemper antiserum
AS—Bacterial antiserum

TABLE III—FIFTY TYPICAL CASES TREATED WITH VACCINE (5cc) BEFORE SIGNS OF MENINGITIS DEVELOPED

BREED	AGE (months)	SYMPTOMS	INITAIL DOSES VACCINE		OTHER THERAPY	RESULTS
Beagle)same	10	Cough, corneal congestion	102.5	3	Codiene	Well
Beagle)owner	10	Nasal catarrh, listless	104.2	3	SN, morphine	Well
Pointer	7	Nasal catarrh, conjunctivitis	103	3	SN, thiamine	Well
Scotty	4	Diarrhea, tonsillitis	104	3	SD, bismuth, morphine	Well
Cocker cross	4½	Anorexia, pharyngitis	105.2	3	SM, thiamin	Well
Doberman)same	4	Listless, diarrhea, anorexia	104.2	3	SN, morphine	Well
Doberman)owner	4	Cough, diarrhea	103	3	SN, codeine	Well
Cocker	8	Listless, rhinitis	103.3	3	SN, penicillin	Well
Beagle mixed	4	Anorexia, conjunctivitis	103.8	3	None	Well
Cocker	8	Diarrhea, pharyngitis	102.5	3	Tr. opium in karo	Well
Cocker	4	Dyspnea, dehydration	103.8	3	SM, SD, Saline infusions diathermy	Well
Cocker	20	Nasal catarrh, anorexia	102.2	3	SD, sodium cacodylate Thiamin, enemas (cold water)	Died in 18 days pneumonia
Boston Terrier	8	Tonsillitis, cough	102.5	3	ST, penicillin	Well
Cocker	12	Pharyngitis, conjunctivitis	104	3	SD	Well
Dachshund	12	Anorexia, listless, cough	103.2	3	Codeine, streptomycin (in oil & wax)	Well
Cocker	6	Vomiting, anorexia, listless	104.1	3	SN, H.M.C.	Well
Spitz	8	Cough, pharyngitis	103.7	3	SD, dilaudid	Well
Fox Terrier cross	3½	Listless, anorexia, nasal catarrh	102.5	3	SN, vitamins	Well
Cocker	8	Tonsillitis, cornea congested	103	3	SN	Meningitis in 18 days. died
Coon Hound	20	Dyspnea, rales	102.8	3	Penicillin, diathermy	Well
Cocker	18	Nasal catarrh, anorexia	105.6	3	SD	Well
Collie cross	3½	Tonsillitis, rhinitis	103.7	3	SN, SD, aspirin	Well
Fox Terrier	12	Nasal catarrh, diarrhea	104.3	3	SG, SD	Well
Spitz cross	5	Conjunctivitis, nasal catarrh	103.3	2	SD	Chorea in 10 days
Hound	7	Dyspnea, rhinitis, cyanosis, anorexia	102.5	2	Penicillin, oxygen diathermy	Well
Kerry Blue	4½	Diarrhea, pharyngitis	103.5	2	SN, SG	Well
German Police	6	Congested cornea, cough	105	2	SN, codeine	Well
Boston Terrier	8 yrs.	Cough, tonsillitis, cornea congested	102.5	2	ST, codeine	Well
Pekingese	5	Rhinitis, conjunctivitis	104.1	2	SM	Well
Beagle	10	Ulcers penis & mouth diarrhea	105	2	SN, bismuth, nicotinic acid, furacin locally	Well
Boston Terrier	7	Cough	102.8	2.	Vitamin B complex	Well
Boston Terrier	1½	Rhinitis, anorexia	101.5	2	SD, tr. opium & karo	Well
Fox Terrier	12	Tonsillitis, diarrhea	103	2	SN	Died in convulsions in 8 days
Bull Terrier cross	36	Tonsillitis, pharyngitis, cough	100.6	2	SN, codeine	Well
Beagle	3	Tonsillitis	105.3	2	SN, vitamins	Chorea 15 days
Cocker	5	Nasal catarrh, diarrhea conjunctivitis	102.3	2	SD, bismuth	Convulsions next day. Died
Fox Terrier	6	Congested cornea, vomiting listless	- -	2	SD, morphine	Well
Cocker	12	Tonsillitis, cough	104.5	2	SN, dilaudid	Well
Fox Terrier cross	3	Anorexia, listless, cough	103	1	SN, codeine	Well
Cocker	4½	Congested cornea	104.2	1	SN, streptomycin (aqueous sol.)	Died convl. in 3 weeks
Boston Terrier	6	Pharyngitis, anorexia	103.5	1	SD	Well
German Police	9	Nasal catarrh	102.3	1	SN, penicillin .	Well
English Bulldog	4	Pharyngitis, conjunctiitis	104.1	1	SD, aspirin	Well
Spitz	4	Conjunctivitis, listless anorexia	102	1	SN	Convl. in 4 days
Spitz	9	Rhinitis, vomiting	104	1	SN, H.M.C.	Died conv. 10 dy
Hound	4½	Conjunctivitis, dyspnea	102.2	1	SP, vitamins	Died in 3 weeks.
Pekingese	6	Ulcerative keratitis cough anorexia	103	1	ST, penicillin	Chorea 14 days
Cocker mixed	10	Tonsillitis, cough	101	1	SN, codeine	Well
Cocker	24	Nasal catarrh, listless anorexia	103.5	1	SN, penicillin	Well
Beagle	6	Rhinitis, pharyngitis anorexia	102.5	1	SN	Well

SN—Sulfanilamide
ST—Sulfathiazole
SD—Sulfadiazine
SP—Sulfapyridine
SM—Sulfamerazine
SG—Sulfaguanidine

vulsions. Paraplegia comes on spontaneously with no other nervous symptoms preceding it.

After years of wishing, I am completely satisfied that this goal has been reached. At least it works here in Kentucky. During the past three years I have been treating distemper with canine antidistemper vaccine and have found three doses five days apart prevents meningitis in 95% of my distemper cases. Previously meningitis occurred in approximately 50% of my cases during severe epidemics. During the past three years Lederle Laboratories have made a fortune selling me distemper vaccine. *But,* I have built up a nice reputation. It pays to use it in spite of the cost. Distemper vaccine usually checks the development of meningitis if given before the virus enters the central nervous system. It does not work once the animal develops meningitis. The owner is told that these injections (antimeningitis shots to him) will prevent meningitis in 95% of the cases and that if the animal does not have a fit within a week after the last "shot," then the chances of recovery are excellent. Earlier only one or two injections were used but now I give 5cc of vaccine every five days for three doses.

Conclusions: 1. The mortality is much higher in dogs under one year of age.

2. Always check the feces in chronic diarrhea for hookworm & whipworm eggs. Treat the whipworms by rectal injection of N-butyl chloride. In puppies between 6 and 12 weeks of age check the feces for coccidia. Coccidiosis in puppies resembles distemper.

3. In my experience: Sulfanilamide is the best all around sulfa drug and is the least toxic in dogs. Sulfapyridine is the best in pneumonias. Sulfathiazole is the best in eye infections, but causes considerable nausea. Sulfanilamide works better than sulfaguanidine or sulfathalidine in diarrheas. Sulfadiazine and sulfamerazine are seldom used now for acute infectious diseases. They do not work as well in dogs as they do in humans.

4. To compound streptomycin in oil & wax (penicillin vehicle): Dissolve one gram streptomycin in 2cc sterile water. Melt the oil & wax. Mix 1cc streptomycin solution with 2cc oil & wax and give subcutaneously every 12 hours with 0.5 gram streptomycin.

Goiter in Dogs

Between 1918 and 1925 I conducted necropsies on approximately 2000 adult dogs in Chicago, among which the incidence of goiter was 98% and of "cancer" of the thyroid with gross pulmonary metastasis 1.6%. Goiters and cancer of the thyroid completely disappeared from Chicago dogs after 1925 or one or two years after iodized salt became a general grocery store commodity.—A. C. Ivy in *Science.*

Rabies Control

The close relationship of man and dog appears to be the determining factor against restricting the freedom of dogs to run at large. Therefore, the degree of success that can be expected from quarantine and patrolling is measured by the amount of cooperation dog owners are willing to share with health officials.—*J. S. McDaniel,* Veterinarian in Charge of Rabies Control, New Jersey State Department of Health.

In a test of arecoline hydrobromide against tapeworms in dogs in New Zealand, Batham treated 157 artifically infected dogs. The drug was given orally in water and in meat and injected subcutaneously. Dosage was at the rate of 1/32 to ¼ grain per pound live weight. The efficacy of the smaller dose was 95%. Larger doses gave no better results against the tapeworms but caused objectionable reaction in the dogs. The animals were generally negative after three doses. In addition to removing Taenia spp. and Dipylidium, arecoline removed about 50% of the Toxocara but had no effect on hookworms.

Removal of Eyeball

Enucleation of the eyeball may be necessary as a result of severe injuries, perforating ulcers of the cornea or edema of the eyeball. General anesthesia is best for this operation. Detach the conjunctival sac from all tissues except the eyeball. Sever the muscles nerves and blood vessels and remove the eyeball. Pack the cavity to control hemorrhage. Remove the packing in 24 hours. Remove as much of the eyelids as may be necessary to leave the area smooth when sutured. Suture leaving the end of the suture hang through a small opening at the inner angle of the incision. If after the wound is healed the area is sunken or uneven inject 10 to 15cc of paraffine which has been liquefied by warming to a temperature of 110°F. and manipulate the parts as it cools until the contour is smooth and even.

USE OF TYROTHRICIN IN BURNS

By FRANK VIGUE, D.V.M.
Sanford, Maine

MANY animals were burned in the great fire which devastated a large area in southern Maine in the fall of 1947. Entire towns were evacuated so hastily that no time was left for the collecting of family pets and moving livestock. Many animals were fatally burned, but a great number was less severely injured. This paper covers the treatment of some of the small animals brought to the hospital during the fire. Of a total of 47 dogs and cats, 19 were too severely burned to justify any attempt at treatment and euthanasia was employed. Of the remaining 28, 16 were hospitalized and 12 treated and discharged for care at home.

While burns are generally classified as to the severity, i.e., first degree: simple reddening; second degree: appearance of vesicles or blisters; and third degree: destruction of vitality of tissues; no attempt was made to grade these cases as many animals suffered more than one type. As a general rule we found burns of the feet and legs of third degree burns, however, presented a number minor degree.

The treatment of minor burns was not a serious problem. Both tyrothricin ointment[1] and aqueous solution[2] gave excellent results in these cases. The treatment of third degree burns, however presented a number of difficulties. Invariably the burned tissues sloughed and became badly infected. Some of the drugs used were 0.5% aqueous solution of tannic acid in packs, mild boric acid ointment and solution, various sulfonamides, xeroform, and tyrothricin. Basing clinical evaluation on the ease and comfort of application; disappearance of infection, necrotic tissues and abnormal exudates, and the appearance of healthy granulation tissues; the best results were obtained with tyrothricin.

Both solution and ointment forms of this antibiotic were used. The liquid was employed in wet packs which were moistened two to four times daily and changed every 24 hours. The ointment was generously applied twice daily and it was noticed that less pain was evidenced when this form was used. Some soothing effect was attributed to the cold cream base which also permitted easier removal of dressings. In early treatment, where pain was very great, 5% benzocaine was added to the solution for analgesia but not much effect from it was noticed. This was believed to be due to the large quantity of dead tissues and secretions present, which served to inhibit the action of the anesthetic.

In this study tyrothricin proved to be nontoxic and non-irritating. In the cold cream base ointment it was easily applied and easily removed from the sensitive tissues. As evidenced by the rapid arrest of infection, it possessed a prompt and prolonged bactericidal effect. After continuous daily use for as long as eight weeks no sensitization of the animals occurred as has been reported in some human patients[3].

Newspaper accounts of the great forest fires in Maine last fall stressed the great loss of wild animals but did not tell of the loss of domestic animals

In conclusion, it should be added that the treatment of burns with tyrothricin and the likelihood of successful termination depend upon some other factors. For maximum bactericidal action, frequent application is important because in burns large amounts of tissue exudates accumulate and dilute the drug. Tyrothricin was found to possess an advantage over other antibiotic agents in that the presence of the exudates did not markedly reduce its efficiency. Another important factor to consider is the correction of the hypoproteinemia which accompanies severe burns.

This is due to the loss of blood plasma and was corrected by intraveneous injection of normal serum and oral feeding of amino acids. In addition a diet high in good quality protein was provided.

[1]Tyroderm, 0.5mg tyrothricin per gram; a Sharp and Dohme product.
[2]Ty-Sin, 2mg tyrothricin per cc; a Jensen-Salsberry product.
[3]Kozall, Donald D., Meyer Karl A., Hoffman, Wm. S. and Levine, Seymour. Use of tyrothricin in surgical infections **Surg. Gyn. & Obst.** 83, p. 393 (September) 1946

ENCEPHALITIS FOLLOWING CARRE DISTEMPER

By LEON F. WHITNEY, D.V.M.
Orange, Conn.

So much has been written in veterinary journals, all over the world, relative to encephalitis that one gets the impression that most veterinarians consider encephalitis to be a disease. Of course they do not. We hear of "infectious encephalitis" and "canine encephalitis" as if the *condition* were a primary affliction, just as so many laymen mistakenly speak of *jaundice* as a disease, rather than a condition; or call all convulsions "fright disease" or "hysteria" regardless of whether they be due to nutritional causes, influenza or intestinal or other peripheral nerve irritation.

Since encephalitis is *inflammation of the brain,* it may be due to a variety of agents. Rabies is the nearest thing to a true primary encephalitis of which we know. If any *disease* should be called encephalitis, it is rabies. The *condition* follows many causes: viruses, bacteria, coccidiosis, and toxins, and perhaps some nutritional deficiencies. Most of these agents produce diseases; some quite specific as to the tissue of their adaption and some of a generalized nature. Thus encephalitis is a symptom of several diseases. Usually it is an extension of the primary infection as in canine distemper where the first tissues involved are those of the respiratory tract and brain involvement comes much later.

Since, to my knowledge, no statistical study of the percentage of encephalitis cases following Carré distemper has been reported, it seems worthwhile to investigate this problem in order to compare it with the percentage following canine pharyngolaryngotracheitis, commonly called housedog disease. Carré distemper is seen so seldom in our section of Connecticut that, today, it would scarcely be possible to make such a study.

It is fortunate, therefore, that figures were kept on the disease in the past. During an epizootic one winter in the author's experimental kennel, 90 cases of genuine Carré distemper occurred. Records of daily temperatures and the outcome were carefully kept from the beginning to the end of this siege. Of the 90 dogs affected, 32 died in the early stages of the disease. These were puppies of low resistance, including Bloodhounds and Bloodhound-Great Dane crosses. The remaining 58 infected animals lived long enough to develop encephalitis if they were going to develop that complication. Actually only 12 of them, or 20.6%, did develop encephalitis. Had the 32 that died early in the attack lived as long as the latter group, the percentage of those developing encephalitis might have been higher.

These dogs were mostly in the age group of under six months with a few among the six months-to-one year group. Therefore it is interesting to note the comparison between encephalitis following Carré distemper and that following housedog disease. The former is a far more severe infection than the latter. Virus distemper is attended by thick nasal and ocular discharges, high temperature, along with evil smelling and often bloody fecal discharges; while housedog disease shows mild symptoms, a temperature seldom higher than 106°F., very little nasal and ocular discharge and a few days of loose evacuations or mild diarrhea.

Despite this great difference in the severity of the two infections, the milder one the more often invades the brain and produces encephalitis.[1] Housedog disease produces encephalitis in 36% of the cases under six months of age, and in 22% of the cases between six months and a year. Carré distemper might produce a similar effect if 100% of the dogs lived through it, as is the case with housedog disease.

It is easy to miss the true disease in the case of housedog disease and yet see the encephalitis. Often calling the disease entity encephalitis confuses the dog owner, who thinks his dog has a disease which he calls encephalitis. This leads to further confusion. Shall Carré distemper be called encephalitis? Shall rabies? Or shall each disease be known by its true name and the ensuing complication—the inflammation of the brain which follows so many diseases—be called encephalitis? The client can then be made to understand that the true disease preceded this condition, for which very little can be done after it develops.

[1]Whitney, L. F., Housedog Disease, **Vet. Med.** 38, pp. 419-429.

Veterinary Problems in Poultry Production

By W. R. HINSHAW, D.V.M., Ph.D., Davis California

In the July issue the writer reviewed a few of the papers presented at the annual meeting of the Poultry Science Association held at Fort Collins, Colorado, June 21 to 24, 1948. Additional papers from that meeting, which are of interest to veterinarians are given below. Abstracts of these reports will be published in the September 1948 issue of *Poultry Science*.

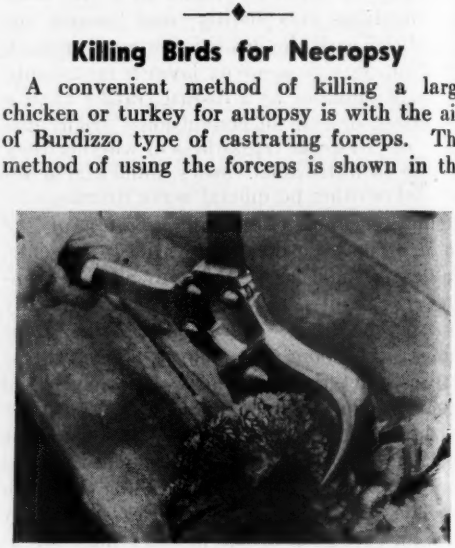
In the field of nutrition, Wilgus and coworkers at the Colorado Agricultural Experiment Station, presented data on the iodine requirements of chickens. They found that the minimum requirements of chickens for iodine per pound of feed, is approximately 0.5mg for growing birds and 0.2mg for laying birds. It was concluded that practical chick rations should contain at least 0.5mg and preferably 1.0mg per pound. Hatchability and quality of chicks hatched were unfavorably affected by amounts of iodine in access of 23mg per pound of ration fed to the dams.

The tendency towards pendulous crops in turkeys is inherited, but is dependent on several environmental factors, which include drinking excessive amounts of liquids as the result of hot weather, excessive eating of coarse grasses and, probably, faulty diets. The most practical way to prevent the condition is to mark each bird, that shows even a slight enlargement of the crop, and to make sure that such birds are not kept for breeders.

Breeding turkeys were shown, by Kohlmeyer and Moxon of the South Dakota Experiment Station, to be susceptible to selenium poisoning. They found, however, that turkeys tolerate a higher level of selenium in the breeding rations than do chickens. When nine parts per million, or more, of selenium were added to turkey breeding rations, the poults hatched showed typical sparse wiry down, and many of the unhatched eggs showed abnormal embryo development. Many of these embryos failed to develop upper beaks and some developed two pairs of legs and two pairs of wings. This type of poisoning is of economic importance in areas where local grain raised on land containing high amounts of selenium is fed to breeding flocks of chickens and turkeys.

Killing Birds for Necropsy

A convenient method of killing a large chicken or turkey for autopsy is with the aid of Burdizzo type of castrating forceps. The method of using the forceps is shown in the



accompanying illustration. Since there are several sizes of forceps, one can select the size suitable to the bird to be sacrificed. As shown in the illustration, the jaws of the forceps are opened and placed in position. When closed carefully the jaws separate the vertebrae and sever the spinal cord and jugular vein without breaking the skin.

Another method of killing birds for autopsy without external loss of blood is by electrocution, with the same type of apparatus which is in common use for killing larger animals. Both turkeys and chickens may be killed by this method and die instantly if proper connections are made. One electrode is clamped on the lower jaw in such a position that part of the clamp is in the mouth; the second electrode is then clamped into the skin and mucous membrane of the anal region. When these are in position, the cord is plugged into the electric circuit. One must be careful not to touch the bird until after the circuit is broken. If necessary to restrain the bird for electrocution, the wings can be locked together, but this is not usually necessary.

Abstracts

Experiments with the Pregnancy Test of Cuboni

A reliable (98 to 99%) chemical test for pregnancy[12] in the mare after the fifth month of gestation is that of Cuboni. In order to demonstrate the follicle hormone, 15cc of filtered urine is mixed with 5cc of concentrated HCL and boiled in water bath for 10 minutes. After cooling it is agitated with 18cc of benzol 50 times. The benzol solution thus obtained is agitated 50 times with concentrated H_2SO_4. Thereafter the H_2SO_4 is heated in a test tube in a water bath at 80°C. If follicle hormone is present, a green fluorescensce is seen against a dark background with light falling upon it. If negative the reagent is malaga red. Because of a temporary lack of benzol, the author used toluol, chloroform and benzine (gasoline). Toluol (toluene) is now available, and may replace benzol.—*J. J. Meier.*

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The Diagnosis of Pregnancy in Mare by Means of Hormones

The Aschheim-Zondek-Kust test for pregnancy in the mare gives, after 42 days great probability,[12] and after 50 days certainty. This test, the purpose of which is to demonstrate hypopysis and ovarian hormones, is exercised as follows: 50cc of blood is withdrawn from the jugular vein and centrifuged for 10 minutes, then 10cc of the supernatant, sterile serum is collected in a sterile vial.

Four female, juvenile white mice each get five subcutaneous injections of 0.4 to 0.5cc of the serum at 12-hour intervals. Forty-eight hours after the last injection the mice are killed by gas.

The mare is pregnant if at least two of the mice show at least one hemorrhagic spot on the ovary.

At the end of the fifth month of gestation and later, the following test of Allan and Doisy—the active agent of which is follicular hormone — gives reliable results. Urine is used with this test. Five subcutaneous injections of 0.1 to 0.3cc are given at 12-hour intervals. Twenty-four hours after the last injection and twice at 12-hour intervals subsequently, the secretion of the vagina is examined microscopically. The mare is pregnant if horned, epithelial cells, without nuclei, are found.—*J. J. Meier.*

[12]Kufferath, E. Experiments with the pregnancy test of Cuboni. **Tierartz. Rundsch.** (March) 1948

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Sulfapyridine Coccidiosis in Chickens

The author made successful trials in administering chickens eulodron, cibazol, and sulfapyridine dissolved in water or in buttermilk; employing one to five grams per 500cc of liquid in doses of 5cc each at 12-hour intervals. Good success followed promptly; no more bloody diarrhea after 24 hours. The effect of the sulfonamide dissolved in buttermilk was definitely superior to the effect of the drug in aqueous solution. Success was also attained in apparently moribund chickens. When pulverized tablets were dissolved a sediment remained; therefore, the author used solutions prepared for intravenous use for diluting with buttermilk. To avoid losses the author advises the production of these drugs in fluid form for such use.—*J. J. Meier.*

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Bulletins, Circulars, Reports, etc.

Rabies.—by *J. S. McDaniel,* Veterinarian in Charge, Rabies Control Unit. New Jersey State Department of Health, Trenton 7, N. J.

Home Cured Pork.—Circ. 377, Ext. Serv. University of Wisconsin, Madison.

Dehydrated Potatoes for Swine.— Article 30-49 Michigan Agr. Exp. Sta., East Lansing.

Roughage in the Dairy Cow Ration.— A discussion of forage quality, functions and requirements in the ration of the dairy cow. Ralston Purina Company, St. Louis, Mo.

Rat Control.—Rats are probably decreasing in numbers in some localities in the United States. The chief factors responsible are sanitary requirements and modern building construction, which make food and shelter increasingly difficult for rats to find. As facts relating to the spread of communicable diseases have become better known, more general interest in rat control has been stimulated and information regarding the development of more effective methods of destroying rats has been widely distributed. However, despite all that has been done to combat the rat, this pest is still mankind's greatest enemy in the animal world. Conservation Bul. No. 8. Fish & Wild Life Service, U. S. Dept. of the Interior. For sale by the Superintendent of Documents, Washington, D. C. Price 10 cents.

[12]Wagner, E. The Diagnosis of Pregnancy in the mare. **Tierartz. Rundsch** (March) 1948

[12]Sieger. Experiments in the treatment of coccidiosis in chickens with sulfonamides. **Tierartz. Rundsch.** (March) 1948.

Book Reviews

Veterinary Helminthology and Entomology: The Diseases of Domesitcated Animals caused by Heminth and Arthropod Parasites, by *H. O. Monnig,* B.A., Dr. Phil., B.V.Sc., General Manager Agricura Laboratories; formerly Professor of Parasitology, Faculty of Veterinary Science, University of Pretoria, and Veterinary Research Officer, Onderstepoort, South Africa. Third Edition, 427 pages; 275 illustrations, 15 full-page plates. Published by Williams and Wilkins Company, Baltimore, Maryland. 1947. Price $9.00.

It is welcome news that Monnig's parasitology is again available, after a long absence from the American market. For some years we have been without a substitute for this work. Cameron deals only with internal parasites, Chandler deals mainly with the parasites of man and but briefly indeed with those which affect animals exclusively. Hall, Underwood and others are out of print.

This edition retains the features that achieved immediate popularity for the work when it first appeared (1934). The changes comprise only new knowledge on the subject of parasitology, developed during and since the war years and eight full-page plates of worm eggs. These latter were a serious omission from earlier editions. This work was probably the first to stress the important influence of nutrition in parasitism; adding to the old dictum "parasites cause unthriftiness" the reverse also "unthriftiness causes parasitism". Monnig puts it, "feeding is one of the best prophylactic measures against parasites".

As the title implies, protozoa are not considered nor are the parasites that infest only wild animals including fish. However, the important parasites of domestic animals, including birds and fur bearers raised on ranches, receive adequate consideration for the purposes of the veterinary practitioner. The treatise includes morphology, life history, identification of eggs, pathogenicity, pathogenesis, symptoms of infestation and expedient methods of treatment and prevention.

In a work of such authenticity it is surprising to find an obvious error of the first edition repeated in this one. It is stated: "In 1891 a campaign of extermination by systematic dipping against this tick (*Boophilus annulatus*) was started in the United States, working southward from the northern limits of distribution of the parasite, with the result that the greater part of the infected area has now been cleaned". The date was 1906, not 1891. As for the remainder of the sentence; although an occasional reinfection of a border county *is* a lesser part of the original infected area, the statement is too far "under" to be considered accurate.

In the review of the first edition of this work (p. 89, Feb., 1935) it was stated: "The increasing realization of the importance of parasitic diseases and the increasing prevalence and ever-extending distribution of animal parasites will assure this text a welcome from veterinary practitioners and veterinary students, whose needs it will serve in an acceptable manner."

That statement is still applicable.

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The Physiology of Domestic Animals. by H. H. Dukes, D.V.M., M.S., Professor of Veterinary Physiology, New York State Veterinary College, Cornell University; with a chapter on the Physiochemical Basis of Physiological Phenomena by *E. A. Hewitt,* D.V.M., Ph.D., Professor of Veterinary Physiology, Division of Veterinary Medicine, Iowa State College, and a chapter on Endocrine Organs, Reproduction and Growth by *S. A. Asdell,* M.A., Ph.D., Professor of Animal Physiology, New York State College of Agriculture, Cornell University. Sixth edition; 817 pages; 184 illustrations. Published by Comstock Publishing Company, Ithaca, N. Y. 1948. Price $7.00.

One of the laudable characteristics of "Dukes' Physiology" is periodical revision and extension of the text to incorporate new discoveries in the field of body function and new knowledge developed by research or otherwise. This is the more praiseworthy on the part of the author and the publisher, since it is accomplished without the stimulus of competitors in its field.

In the preface we are told "even during the war year rapid progress continued to be made in many fields of physiological inquiry. Extensive revision of the text has, therefore, been necessary." The extent of the revision no doubt impressed the author more than it will the reader. The plan and scope of the work remains as it has been described in reviews of earlier editions in these pages. There are a few additional pages made necessary by the inclusion of new knowledge; there is a discussion of isotopes, radioactive isotopes and a new section on growth. The important discoveries made by use of isotopes are added to the section on protein metabolism. For the remainder, the revisions are unobtrusively incorporated in the text.

The revisions the work has undergone has served to almost, but not quite, eliminate

typographical errors and other inadvertencies, but one modification, it appears to this reviewer, would improve the readability of the work and enhance its interest. The author's attitude is too detached; he dispassionately records the work of others without offering an interpretation of his own; where conclusions of investigators differ he gives no intimation of which he endorses, and even well-established theories are presented with a qualification that seems over-cautious. Examples of the latter: "The number of bacteria in the rumen that are capable of synthesizing urea into their own protein must be very great" (p. 466). The context implies "must be" should read "is". Again on the same page: "Evidently those proteins that contain amino acids of such kinds and in such proportions as are required for nutritive purposes, possess the greatest nutritive value." The "evidently" seems an unnecessary anchor to the windward. Many such slight qualifications of generally accepted statements could be cited. They do not detract from the scientific accuracy of the work.

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The Bulldog: —An Illustrated Standard of the Breed. A Picture Study of Good Points and Faults —containing Information on History, Anatomy, Breeding, Feeding, Training and Management, by *Enno Meyer*. 151 Pages; illustrated. Published by Orange Judd Publishing Company, New York. 1948. Price $3.00.

Here is a work on "this lovable ancient-breed" which possesses the pulchritude of a horned toad and the mental capacity of a dodo, for which the experts have only encomiums. The author, always a sportsman and hunter, was an all-breed judge for more than 40 years and a practical breeder of 26 breeds of dogs. Professionally he was an artist and sculptor of dogs. He died just before completion of the manuscript of this work.

With this background only a thorough and authoritative treatise would be expected from the author and this he has achieved. The chapters on the origin of the bulldog and the history of the breed in America, are particularly well done as are those on anatomy and breeding. "Training and Management" reflects the author's own extensive experience and, albeit somewhat tedious, is interesting and informative, but only one who can look into the face of a bulldog and love it can endure the tediousness of the final chapter on the standard, champions, winners and gossipy trivia.

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Veterinary Protozoology, by *Banner Bill Morgan*, B.S., M.S., Ph.D., Associate Professor of Veterinary Science, College of Agriculture, University of Wisconsin, and *Philip A. Hawkins*, A.B., M.A., D.V.M., Associate Professor of Parasitology, School of Veterinary Medicine, Michigan State College. 195 pages; 21 full page plates containing from two to nine illustrations each, and maps showing the distribution of dourine, tick fever of cattle, and anaplasmosis in the United States. Published by Burgess Publishing Company, Minneapolis 15, Minnesota. 1948. Price $4.00.

As has been mentioned in these pages on more than one occasion, reproduction of typewritten manuscript by a photographic process is not a satisfactory method of publication for a scientific treatise. Because of the printers' strike in Chicago the reproduction of tables in this magazine by this process has been imperative and in this limited manner has been accepted with reluctance. Authors of textbooks on scientific subjects do themselves an injustice by accepting this substitute for conventional printing. If the statement that first impressions are lasting is measurably true, many readers must be disappointed in works so printed.

This is the first monograph on pathogenic protozoa of animals to appear in this country. Veterinary protozoology is included in most veterinary bacteriologies as logically as are discussions of viruses, yeast, molds and higher fungi of pathogenic significance. The greater appreciation of the importance of viruses as causes of disease has resulted in several monographs recently on those organisms. Parasitic protozoa, too, are due for this more extensive treatment and receive it in this monograph.

It is not easy for us who live in temperate climates to appreciate that the most destructive and, economically, the most costly disease of mankind (malaria) is caused by a protozoon, nor that diseases of animals caused by protozoa exceed in importance in the tropics diseases due to either bacteria or viruses. This work is limited geographically to North America; practically to the United States and the Dominion of Canada. In that field it is a valuable contribution to the knowledge of the pathogenic protozoa of animals and a welcome textbook and reference work.

Quoting from the preface: "The volume gives a brief description of the protozoan par-

asites of domestic animals and the diseases they cause. It is intended as a practical treatise, with emphasis on morphology, life histories, pathology, diagnosis, treatment and control of the parasitic protozoa which occur in domestic animals of North America." In addition to supplying the need of veterinary students, veterinary practitioners and agricultural students for a handbook on protozoology, "it may also be helpful and useful to protozoologists, zoologists, biologists, parasitologists and public health workers."

Future editions can be improved by including more of the history of protozoan diseases and perhaps modifying some of that which is given. For example, California is not included in the states named as having experienced outbreaks of dourine. More important, a map is reproduced, showing the territory in which tick fever infection was present in 1906 and in 1942; the latter purporting to show "the present quarantined areas". These areas are not the same in 1948.

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Veterinary Protozoology, by *U. F. Richardson,* B.Sc., M.R.C.V.S., 240 pages; 34 illustrations and one color plate showing stained preparations of 17 pathogenic protozoa. Published by Oliver and Boyd, Edinburgh, Scotland. 1948. Price $3.00.

By coincidence, the publication of the first two works on veterinary protozoology was announced in the same month. Except for coccidiosis mainly of birds and rabbits, protozoan diseases of domestic animals are much less important in Britain than in the United States and this work is not limited to a discussion of protozoa and protozoan disease of the continent in which it was published, as is the work of the same title by Morgan and Hawkins, but deals with these subjects the world over. It was "written in hope that it may be of value to veterinary students and to workers in the tropics, *where protozoan diseases are the principal problems of the veterinary surgeon and the chief obstacle to livestock improvement* (ital. ours).

The plan of this work is somewhat different from that of the text of Morgan and Hawkins, reviewed in the foregoing. In the latter the discussions follow the zoological classifications In this work in part the plan adopted in the study of viruses is followed; i.e., organisms are grouped according to the tissues invaded—Sporozoa of the intestinal and urinary tracts, Sporozoa of the endothelial and lymphatic systems, and Sporozoa of the red blood corpuscles. Trypanosomes are classed into those transmitted by tsetse flies and those not transmitted by tsetse flies. Flagellates are divided into those having one flagellum and those having a greater number.

A chapter on the chemotherapy of protozoan disease and a chapter on the collection and staining of specimens of protozoa complete the work.

Although this work is not channeled to the problems of American veterinarians in the field of protozoan diseases, as is that of Morgan and Hawkins, it contains much valuable general information on the subject and will be welcomed by American veterinarians to whom both books are essential for a comprehensive understanding of the available knowledge on the subject.

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A Laboratory Manual of Physiology for Veterinary Students, by *Cyde F. Cairy,* D.V.M., M.S., Associate Professor of Veterinary Physiology and Pharmacology, Michigan State College. Revised edition; spiral binding, offset printing; 191 pages, including blanks for recording the results of experiments. Published by Burgess Publishing Company, Minneapolis, Minnesota. 1948. Price $3.00.

This work is strictly a laboratory guide and is not designed to substitute for lectures or a textbook on veterinary physiology. The experiments outlined and described are intended to provide laboratory exercises for one academic year.

The exercises seem well planned and adequately presented. It is disconcerting, however, to run onto "per orum" in the foreword; particularly of a second edition.

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A Laboratory Manual of Experimental Pharmacology for Veterinary Students, by *Bernard V. Alfredson,* D.V.M., M.S., Professor of Physiology and Pharmacology, Michigan State College. Revised edition; spiral binding; offset printing; 156 pages including blanks for recording experiments; 14 illustrations. Published by Burgess Publishing Company, Minneapolis 15, Minnesota. 1947. Price $2.75.

As the title implies this work is intended only to serve as a laboratory manual. The experiments presented for study were selected as a result of an experience of several years in teaching the subject to veterinary students and are designed to meet their particular needs. It is not intended as a complete coverage of the subject.

In an excellent introduction "per orem" causes the reader to speculate as to the care exercised in preparing the manuscript.